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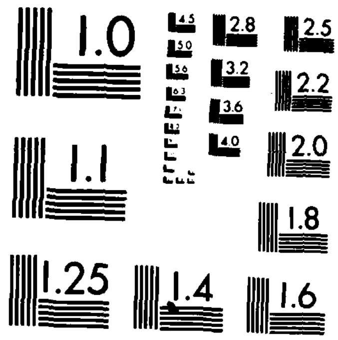

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USAFOEHL REPORT

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DOVER AFB CHARACTERIZATION/HAZARDOUS WASTE MANAGEMENT SURVEY, DOVER AFB DE

ROBERT D. BINOVI, MAJOR, USAF, BSC

ELLIOT K. NG, MAJOR, USAF, BSC

FRANCIS E. SLAVICH, 2LT, USAF, BSC

July 1986

Final Report

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USAF Occupational and Environmental Health Laboratory
Aerospace Medical Division (AFSC)
Brooks Air Force Base, Texas 78235-5501

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This report has been reviewed and is approved for publication.

JOHN J. COUGHLIN, Colonel, USAF, BSC
Commander

Prepared By:

ROBERT D. BINOVI, Maj, USAF, BSC
Chief, Water Quality Function

ELLIOT K. NG, Maj, USAF, BSC
Chief, Hazardous Waste Function

FRANCIS E. SLAVICH, 2Lt, USAF, BSC
Water Quality Function

Reviewed By:

MARLIN L. SWEIGART, Lt Col, USAF, BSC
Chief, Environment Quality Branch

DARRYL F. MARKLAND, Col, USAF, BSC
Chief, Consultant Services Division

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RACT (Continue on reverse if necessary and identify by block number)

SAFOEHL conducted an on site wastewater characterization survey at Dover AFB DE from
to 7 Mar 86 at the request of HQ MAC/SGPB. The survey was designed to establish pre-
ment requirements by determining quantities and concentrations of pollutants expected
the industrial operations or develope and evaluate alternate solutions to decrease the
rge of wastewater contaminants. Effluents from industrial and domestic wastewater were
ed. Kent County DE has imposed stringent pretreatment standards by changing the same
location from a point where industrial wastewater is combined with considerably more
ic wastewater to a point where only industrial wastewater combines. Effluent limita-
of cadmium were exceeded during each of the seven days sampling. Sources of cadmium
found to be metal fabrication, corrosion control and vehicle maintenance operations.
endations: (1) Clean lift station sumps. (2) Change method of stripping. (3) Install
atment operation to remove chromium and Cadium from the wastewater prior to discharge

(see reverse)

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AE OF RESPONSIBLE INDIVIDUAL bert D. Binovi	22b. TELEPHONE (Include Area Code) (512) 536-3305	22c. OFFICE SYMBOL USAFOEHL/ECQ

Item 19 cont'd.

into the sanitary sewer. 4) Perform periodic EP Toxicity testing on neutralized battery aci 5) Repipe vats in building 719 to provide piping dedicated to each vat. 6) Negotiate with solvent recovery representative to provide a system for a trial period.

ACKNOWLEDGMENTS

The authors would like to express their appreciation for the support of 1Lt Robert A. Tetla, Consultant, MSgt Horace Burbage, SrA Tammy Johnson, A1C Pete Davis, and A1C Ross Simmons, technicians, USAFOEHL/ECQ, in accomplishing this survey. The support of Capt Link Waterhouse, MSgt Hartman, and the other members of the Dover Environmental Engineering Section was greatly appreciated as well.

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I. INTRODUCTION

In a 6 Nov 85 letter, the USAF Hospital Dover, Bioenvironmental Engineering Section (SGPB) requested the USAF Occupational and Environmental Health Laboratory Environmental Quality Branch (USAFOEHL/ECQ) conduct a survey to quantify the wastewater contaminants in the industrial sewer system and make recommendations for pretreatment control (Atch 1).

The survey was conducted by Majors Robert D. Binovi and Elliot K. Ng, 1Lt Robert A. Tetla, 2Lt Francis E. Slavich, MSgt Horace C. Burbage, Sgt Tammy W. Johnson, and A1Cs Robert P. Davis and Ross W. Simmons, USAFOEHL/ECQ from 25 February to 7 March 86.

II. BACKGROUND

A. Introduction

Dover AFB, the home of the 436th Military Airlift Wing since 1966, is located a few miles south of the city of Dover, Kent County, Delaware. The base serves as a large military cargo terminal and supports large transport aircraft. Base population at the time of the survey was approximately 15,366 people.

Kent County has a continental type of climate, with well defined seasons. The Atlantic Ocean, Delaware Bay, and Chesapeake Bay exert considerable modifying influence on the climate. The warmest period of the year is the last part of July, when the maximum afternoon temperature averages 89 degrees F. The coldest part of the year is the last weeks in January and the beginning of February, when the early morning temperatures average near 24 degrees F. The average high and low temperatures for the survey period were 39.5 and 27.7 degrees F.

The average annual precipitation for Dover is 46 inches. The monthly distribution is fairly uniform during the year; August being the wettest month. The precipitation during the survey period 25 Feb-7 Mar totaled .06 inches.

Industrial operations stem from facility, aircraft, and vehicle maintenance. Wastewater from most of the industrial operations flows through a separate sewer system from the sanitary system. Industrial wastewater is pumped from a lift station (Site 4) into the sanitary system. The combined sanitary and industrial wastewater stream flows off the base property to the Kent County Publicly Owned Treatment Works (POTW) by way of Kent County Lift Station 6. The base industrial treatment system previously had two lagoons to facilitate sedimentation, separation, and oxidation of the industrial wastes. Due to groundwater contamination considerations, the lagoons now have been drained and the flow bypassed.

B. Description of Facilities and Industrial Activities

General. The industrial sewer system is designed to collect the effluent from eight buildings and an open wash rack. Attachment 1 summarizes the chemicals used by each industrial operation during the survey. A description of the operations conducted in each building is as follows:

a. Aircraft Wash Rack, Building 706. This facility is used for washing aircraft and other large parts. During the survey, two aircraft were washed by Galaxy Corp., the corrosion control contractor. Galaxy uses an approved biodegradable aircraft detergent, Calla 800, manufactured by Calla Chemical Operation, P.O. Box H, Stanton CA 90680, for aircraft washing. A petroleum distillate solvent, PD-680 Type II is used also. The amount of chemicals depends upon how long since the aircraft was washed last. According to Mr Nguyen, the Galaxy Supervisor, approximately half a drum of Calla 800 and 30 to 35 gallons of PD-680 Type II are used per aircraft.

b. Open Wash Rack, Adjacent to Building 582. This is an outside wash rack located on the ramp next to building 582. It serves the same function as building 706. Due to the cold weather, this facility was not used during this survey.

c. Paint Stripping Facility, Building 582. This building is primarily used for aircraft paint stripping but also houses the administrative office of Galaxy Corp. The building is used jointly by Galaxy, the Field Maintenance Squadron's Jet Engine and Non-powered AGE shops and Aerial Port Squadron. During the time of the survey, all paint stripping activities in this building had ceased. Operations will resume after drain screens are in place. The residues from the floor drain screens will be drummed and brought to the Defense Reutilization Management Office (DRMO) for disposal. The only operation conducted during this period was cleaning Aerial Port forklifts, using one quart of 815-MX aircraft detergent.

d. Jet Engine Shop, Building 725. This shop is connected to the industrial sewer system by a single floor drain. The shop supervisor indicated no chemicals are disposed of through it, except the detergent used to clean floors.

e. Jet Engine Shop, Building 719. There are five separate shops in this aircraft maintenance facility, the Cleaning Room, the Components Repair Shop, the GTU Shop, Non-powered AGE Propulsion Shop, and Modules and Accessory Repair Shop. However, the Cleaning Room and the Components Repair Shop are the major industrial waste generators.

(1) The Cleaning Room is the major industrial activity in this building. The operation includes stripping, degreasing, and descaling of aircraft parts. According to MSgt Lapinski, waste chemicals and sludges are drummed and disposed of through DRMO. However, large amounts of rinse water are used to remove the stripping compounds, etc., and consequently 5-10% of the industrial chemicals along with the residues from the stripping and scraping operation are washed down the industrial sewer system. The shop personnel have had a 3.5-by-11-foot drip pan constructed to collect the paint

sludge. The contents of this drip pan will be drummed and turned in to DRMO. The shop also cleans aircraft parts by dipping them into vats containing hot carbon remover, PD-680 Type II, and descaling compound. As an interim control measure, the valve draining each vat has been locked to prevent disposal into the industrial sewer system. A project to install a permanent pump and to modify the piping so that shop personnel could empty the contents of the vats directly into 55-gallon drums is planned.

(2) The Components Repair Shop also generates chemical wastes in building 719. According to MSgt Lapinski, about 10 gallons per month of trichloroethane is used in an ultrasonic cleaner. Spent trichloroethane is drained and disposed of in drums.

(3) Located alongside the building is a storage area for drums. Drums are dedicated to collecting waste trichloroethane, used oil, JP-4, and PD-680 Type II. A drum is reserved for unknown waste chemical mixtures, to collect mixed chemical wastes from the Propulsion Branch shops.

f. Paint and Fiberglass Shop, Building 721.

(1) This facility was under renovation at the time of the survey. The Fiberglass Shop was temporarily housed in building 720. The Fiberglass Shop operations have little potential for contributing to the industrial wastewater loading. Generally, the small amount of waste generated is in the solid form. This waste is containerized, then taken to the storage area alongside building 719 and placed into drums for disposal.

(2) The Paint Shop was the only industrial operation in building 721. Methyl Ethyl Ketone (MEK) is used for paint thinning. The spent MEK, along with the remaining lacquer, and other chemicals such as toluene and polyurethane thinner are drummed and disposed of through DRMO. A drum storage area for these wastes is located alongside this building. The shop personnel are attempting to procure a solvent recovery system for MEK, PD-680 Type II, thinners and toluene.

g. Aircraft Maintenance Shop, Building 724. This building contains the Metal Plating, Welding, and Machine Shops. The shops have minimal impact on the industrial sewer system, as the chemicals used in the processes are either used up (e.g., solder) or are collected and disposed of by contractor (e.g., cyanide plating waste). Metal plating is done in a secured room. Two valves prevent the vats from being accidentally discharged into the industrial sewer system. Machine shop personnel said that they do not discharge any chemicals into the industrial sewer and dispose of about five gallons of PD-680 Type II into the PD-680 drum alongside building 721.

h. Refueling Vehicle Maintenance Shop, Building 636. Maintenance of the large refueling vehicles that service aircraft is performed in this building. The shop uses PD-680 Type II, a degreaser composed of hydrocarbons in the boiling ranges of normal alkanes with 9 to 14 carbon atoms, and 815-MX detergent to wash floors. Shop personnel estimate that 1-2% of the jet fuel JP-4 enters the industrial sewer system and is collected at the adjacent oil/water separator. The bulk of the waste tankage is collected and either turned in to Base Supply or used for fire training purposes. Used motor oil and PD-680 Type II are collected in drain pans, drummed and turned in to DRMO. During the survey eight gallons of 815-MX and 47 gallons of JP-4 were used. Two gallons of ethylene glycol were disposed of in the sewer system.

i. Vehicle Maintenance Shop, Building 635

(1) The Allied Trades and General Purpose Vehicle Maintenance Shop are located in this building. Mr F. Weaver, supervisor for Allied Trades, said nothing is disposed of into the industrial sewer system. However, a small quantity of hydrochloric acid was being disposed of in the sewer, according to the chemical inventory. The hydrochloric acid is brushed on radiators before soldering, which is then washed off with water into the industrial system. Mr Weaver states the quantity of acid is less than a gallon per year. Painting is performed in the Allied Trades Shop. The drain for the paint spray booth waterfall had been sealed off from the industrial sewer system, preventing the waterfall tank from being emptied into the sewer. This will require the wastewater and sludge to be pumped into drums, sampled and disposed of as hazardous waste through DRMO, if sampling indicates it's hazardous. The floor drain connected to the industrial sewer system is covered with paper during painting. Finally, paint stripping is not performed in this building. Waste thinner is placed in drums at the drum storage area, located alongside building 719.

(2) According to the supervisor of the General Purpose Vehicle Shop, the only significant industrial wastes entering the industrial sewer are wastewater containing 815-MX detergent from floor washing, and neutralized battery acid. Used oils and antifreeze are placed in drums and turned in to DRMO.

j. Entomology Shop, Building 921. This shop is not connected to the industrial sewer system; however, drains from sinks, etc., are connected to the sanitary sewage system. During the survey period, less than 10 gallons of rinse water were discharged after rinsing the sprayers. Sprayers containing Ficam, Dursban, and Carbamete 15 were rinsed out.

k. Fuel Cell Repair, Building 945. The hangar drains are connected to the sanitary sewage system through an oil/water separator and explosion-proof lift station. Aircraft fuel tanks are repaired and cleaned at this facility.

C. Description of Industrial Wastewater Collection System. The following is a description of the industrial wastewater collection system. A schematic is included as Figure 1.

1. Site 4, Lift Station at old lagoons, near building 610. Site 4 lift station receives industrial wastewater from a four-inch diameter force main from the lift station servicing the vehicle maintenance compound near building 635 and from a three-inch diameter force main from the lift station

near building 719. The Site 4 lift station is equipped with two 175 gpd pumps, which operate alternately and lift the wastewater to the sanitary sewer through a four-inch diameter force main.

2. Site 7, Last manhole on Dover AFB before Kent County Lift Station 6. An 18-inch diameter sanitary sewer transports the combined domestic wastes and industrial waste to the Kent County Pumping Station 6. The wastewater is pumped from here to the Kent County POTW.

3. Industrial Separator, Building 583. This large industrial wastewater gravity separator, consisting of twin sedimentation basins and a sludge pit, is housed in building 583. The effluent from the aircraft wash rack at building 706 and the paint stripping facility, building 582, flows to this separator by gravity and is pumped to the lift station near building 719.

4. Lift Station, Building 719. The lift station near building 719 accepts flow from the separator at building 583, gravity flow from the Engine Shop at building 725 and a three-inch force main from the lift station near building 724.

5. Lift Station, Building 724. The lift station near building 724 accepts gravity flow from the Paint and Fiberglass shop, building 721, and the Aircraft Maintenance shop, building 724.

6. Lift Station, Building 635. The lift station in the parking lot of the vehicle maintenance compound receives gravity flow from Refueling Vehicle Maintenance shop, building 636, and Vehicle Maintenance shop, building 635.

D. Dover AFB Wastewater Discharge Limitations

1. The Delaware Department of Natural Resources and Environmental Control sampled at Site 4 in June 1985. They found a total extractable phenol concentration of 6.64 mg/L and 600 microgram/L chromium. They did not test for methylene chloride. Their results are shown in Attachment 2.

2. The base was issued an Industrial Wastewater Discharge Permit (included as Attachment 3) by the Kent County Regional Sewage Disposal District on 1 October 1985 regulating the wastewater discharge from Site 7. The discharge permit was amended on 10 December 1985 to also regulate the discharge from Site 4. In addition, the permit requires the base to reimburse the county for yearly priority pollutant analysis, and incorporate the scheduled base objectives in reducing industrial waste discharge. The effluent parameters, limitations, and monitoring schedules are contained in Table 1.

Table 1

Effluent Limitations and Monitoring Schedule

Effluent Parameter	Maximum Concentration (mg/L) 24 Hour Flow Proportioned Composite	Maximum Instantaneous
Arsenic	0.1	At no time shall the hourly concentration of the discharge exceed three times the average concentration.
Barium	4.0	
Cadmium	0.03	
Chromium-total	0.5	
Copper	1.0	
Lead	1.0	
Mercury	0.01	
Nickel	0.50	
Selenium	0.50	
Silver	0.2	
Zinc	3.00	
Cyanide-total	1.50	
Phenol	4.0	

Monitoring Requirements

Parameter	Frequency	Type sample
COD	Quarterly	24 hr Composite
Phenol		
Chromium		
Cadmium		
Lead		
Copper		
Mercury		
Zinc		
Oil and Grease		
EPA Priority Pollutant Scan	Semiannually	24 composite except purgeable organics which will be a grab

III. PROCEDURES

A. Flow

1. Flow from the industrial sewer system was measured at Site 4, the old lagoon lift station sump. Measurements were taken by recording the cycling of the alternating 175 gpm pumps with a Manning 1100XU flow meter. The flow meter was calibrated to record the difference in water elevations in the sump between the high water level pump on elevation as 100%, and the low water level pump off elevation as 0%. The number of cycles could be counted

from the 24 hour recorder and multiplied by the volume of water calculated from the sump dimensions and the elevations of on-off pump operation, to find flow. However, this method neglects the volume of water flowing into the sump while the pump is operating. To correct for this, an alternate method was also used. A determination of the time the pump was off was made by scaling this time from the recorder chart and subtracting from the total time of the measurement, then multiplying by the pump capacity to obtain the slightly higher flow.

2. Total sanitary sewage flow from the base into Kent County Lift Station 6 is normally measured at the lift station by an ultrasonic flow meter. However, the flow meter wasn't operating during the survey period, and hadn't since late December. Consequently, daily flow from the base could not be obtained. Kent County reported the average daily flow for March and April 1986 was 1.1 and 1.13 million gallons per day.

B. Sampling

1. Sampling Site Numbers and Locations. A list of sampling site numbers and locations where the samples were taken is shown in Table 2.

Table 2

Sampling Site Locations

Site Number	Site Location
GN86006	6" gravity outfall from bldg 706 into bldg 583 separator
GN86008	6" gravity outfall from bldg 582 into bldg 583 separator
GN86009	6" gravity outfall from bldg 725 into lift station near bldg 719
GN860010	6" gravity outfall from bldg 719 into lift station near bldg 719
GN860011	6" gravity outfall from bldg 721 into lift station near bldg 724
GN860012	6" gravity outfall from bldg 724 into lift station near bldg 724
GN860013	6" gravity outfall from bldg 636 into o/w separator near bldg 636
GN860014	lift station sump near bldg 635
GN860015	Site 4, old lagoon lift station sump
GN860016	Site 7, manhole 60 Lebanon last AF manhole before Kent County lift station 6
GN860017	service from bldg 921 in manhole 413, near Entomology bldg 921
GN860018	o/w separator sump near bldg 945

2. Sampling Frequency. Seven days of 24 hour samples composited hourly were taken at sites GN860015 and GN860016. Sampling at other sites was performed over a 24 hour period, with samples composited hourly. Sampling at GN860016 was composited proportionate to typical flow obtained from historical flow data from the Kent County Lift Station 6 flow meter. December 5, 1985 was selected as representative of typical flow. Composite samples were collected with Isco Model 2100 Automatic Wastewater Composite Samplers. Also, daily grab samples were collected for those analyses requiring this type of collection. Samples were analyzed for the parameters listed in Table 3.

Table 3

Sample Analysis

Analysis	Preservation		EPA Method	Where	Who
Biochemical Oxygen Demand	none		405.1	on-site	USAFOEHL
Chemical Oxygen Demand	H_2SO_4,	4DRGC	Hach Mod. 410.4	on-site	USAFOEHL
Kjeldahl Nitrogen	H_2SO_4,	4DRGC	305.?	off site	Biospherics
Total Rec. Oils & Grease	H_2SO_4,	4DRGC	413.?	"	"
Total Organic Carbon	"	"	415.?	"	"
Total Cyanide	NaOH,	"	335.?	"	"
Total Rec. Phenolics	H_2SO_4,	"	420.?	"	"
As, Ba, Cd, Ca, Cr, Cu, Fe, Pb, Mg, Mn, Ni, Se, Ag, Zn	HNO_3	"	200.7	"	"
Acid/Base/Neutral Extractables	"		625	"	"
Purgeable Organics	H_2SO_4	"	624	"	"
Residue, Nonfilterable		none	160.2	on-site	USAFOEHL

C. Pretreatment Study. Jar testing was performed on samples of industrial wastewater taken from Site 4 to determine the effectiveness of coagulation-flocculation pretreatment. The Phipps Bird apparatus was used with 2000 mL beakers. The procedure for the jar tests included a one minute 100 rpm rapid mixing cycle followed by 30 minute flocculation at 20 rpm and finally one hour quiescent settling. Samples were obtained by carefully decanting from the beakers.

D. Hazardous Waste Survey.

1. Visits to each building on the industrial sewer system were made to observe the industrial activities and to discuss industrial waste disposal practices with shop personnel. Supervisors were asked to account for the chemical usage during the survey period by recording it on a survey form. In some shops, it was determined that accounting was unnecessary because of minimal chemical usage. Other shop supervisors had difficulty determining daily usage but were able to account for chemicals over weekly or monthly periods.

2. The survey included obtaining an updated list of chemicals, determining the quantity used, and the disposal method for each chemical. This information is contained in Attachment 14.

IV. RESULTS AND DISCUSSIONS

A. Flow measurements. Flow measurements from the lift station at Site 4 are contained in Attachment 4. Twenty-four hour flow measurements were hindered by the shortened battery life due to the cold temperatures encountered during the survey. Flows ranged from 18,000 to 35,000 gallons per day. This amounts to less than 3% of total sewage flow.

B. Wastewater Characterization

1. Metals (As,Ba,Ca,Cd,Cu,Fe,Pb,Mn,Hg,Ni,Se,Ag,Zn,Mg). The results of the sampling for metals are contained in Attachment 5. Metals can enter the sewage treatment system from processes such as corrosion control, plating, aircraft and vehicle washing, and battery maintenance. Results showed the vehicle maintenance sump building 635 contained water which exceeded the limits for cadmium, copper, lead, mercury, and zinc. Battery acid disposal and/or corrosion control sludge disposal is probably responsible. Chromium and cadmium concentrations exceeding the limits were found in the outfall from building 719. Cadmium concentrations were exceeded at the outfall from building 706 and at Site 4. Contributions to Site 4 exceeding the cadmium limit are coming from buildings 719 and 635.

2. Cyanides. The results of sampling for cyanides are contained in Attachment 6. Cyanides in wastewater are normally associated with plating wastes. Cyanides were not found at any of the sampling sites.

3. Phenols. The results of sampling for phenols are contained in Attachment 6. Phenols in the wastewater are normally associated with phenolic based paint strippers, an alternative to methylene chloride paint strippers. Results from all sites were below the 4.0 mg/L limit. A residual of 1.37 mg/L was found from building 582, the corrosion control facility. Although phenolic paint strippers are not used currently, residues may still remain in the drains to building 582.

4. Purgeable Organics. The results of sampling for the EPA Method 624 Purgeable Organics are included in Attachment 7. A list of purgeable organics tested for is included as Attachment 8. No limits have been established on purgeable organics. Detectable concentrations of toluene and ethyl benzene were found in the sample from the lift station at building 635. Detectable concentrations of benzene and toluene were found in the oil/water separator at building 945 and a small amount of trichloroethane was found in the manhole at the Entomology Shop, building 413. Significant amounts of methylene chloride, and 1,1,1 trichloroethane were found in one or more days at Site 4, with lesser amounts of trichloroethylene, toluene, and chloroform. These were not detected at any other operation, and appear to be attributable to either sludge or residual water in the Site 4 lift station sump. No purgeable organics were found in any of the seven day grab sampling at Site 7, where the combined industrial and sanitary sewage leave the base.

5. Base/Neutrals and Acids. The results of sampling for the EPA Method 625 Base/Neutrals and Acid Extraction are included in Attachment 10. A list of base/neutral and acid organic compounds tested for is given in Attachments 8 and 9. Concentrations of phthalates commonly associated with the washing of JP-4 residue, were found at the aircraft wash rack, Jet Engine Shop, and Refueling Vehicle Maintenance. The phthalates probably are being formed from the oxidation of the xylenes contained in the fuel. This method identified the phenols that were found at the outfall of building 582, corrosion control facility, probably from residuals of phenolic paint strippers. Pentachlorophenols are used as a wood preservative in the Allied Trades shop.

6. Five Day Biochemical Oxygen Demand (BOD-5) and Chemical Oxygen Demand (COD)

a. BOD-5 results are included in Attachment 11. The average value of BODs taken daily over the seven day sampling period at Site 4 and Pumping Station 6 were 176 and 86 mg/L, respectively. High BOD-5 concentrations were found in the sump of the lift station near building 635 (36,502 mg/L) and from building 719 (925 mg/L).

b. COD results are included in Attachment 11. The average COD concentration taken daily over the seven day sampling period at Site 4 and Pumping Station 6 were 659 and 369 mg/L, respectively. High COD concentrations were found at the sump of the lift station near building 635 (86,000 mg/L), and building 719 (1,600 mg/L).

c. The ratio of BOD/COD for Site 4 and Pumping Station 6 is .27 and .23, respectively. The ratio of BOD/COD for buildings 635 and 719 is .42 and .58, respectively. Higher ratios indicate wastewater with contaminants more readily biodegradable or less inhibitory to biodegradation. Buildings 635 and 719 had high concentrations of oils and grease (see below) which are generally more readily biodegradable.

7. Total Recoverable Oils and Grease. Industrial operations contributing to the oils and grease concentrations at Site 4 appear to be buildings 635 and 636 (lift station at 635 was full of oil), and building 719. The concentration of oils and grease (35.5 mg/L avg) at Pumping Station 6 fall is in the low to normal range for domestic sewage. Results of the sampling for oils and grease are given in Attachment 6.

8. Nonfilterable Residue (Suspended Solids). Results of nonfilterable residue sampling are presented in Attachment 11. The average concentrations at Site 4 and Pumping Station 6 are 29 and 83 mg/L, respectively.

9. Total Organic Carbon, Total Kjeldahl Nitrogen (TKN). Results of sampling for these parameters are included in Attachment 6. Total organic carbon concentrations ranged from 16 mg/L from building 582 to 440 mg/L from building 719. TKN values ranged from 0.2 mg/L from building 725 to 77 mg/L from buildings 719 and 921.

C. Pretreatment Jar Tests. These very preliminary studies of the wastewater from Lift Station 4 showed alum flocculation-coagulation treatment effective for the removal of cadmium and chromium without pH adjustment. Over 90% of the cadmium and chromium were removed at pH values 7.03 and 7.67. Significantly reduced removal efficiency (66% Cd, 52% Cr) was observed when ferric chloride was used as a coagulant. The optimum dosage of alum appears to be in the 130 to 150 mg/L range; thus, approximately 40 pounds of alum per day would be required. Results of the metal and suspended solids removal efficiencies are shown in Attachment 12.

V. OBSERVATIONS AND CONCLUSIONS

A. From a review of the previous sampling results and the imposed Kent County effluent standards, corrosion control operations (excluding washing) are mainly responsible for the base exceeding limitations at Site 4, especially for the parameters cadmium, chromium, and phenols.

B. Levels of chromium and phenols were significantly lower than the State's sampling results of June 1985 and within present and projected levels for these parameters. The fact that no paint stripping at building 582 took place during the survey may account for this. However, the cadmium limit of 0.03 mg/L was exceeded at Site 4 each day during the seven day sampling period. The cadmium found at building 706 may have originated from abrasive or acid cleaning of aircraft parts. The cadmium found in the effluent from building 635 may be traced to paint sludge or solder used for automotive repair.

C. Effective cadmium and chromium removal is possible by gravity sedimentation with aluminum sulfate addition. This process results in the generation of significant quantities of sludge, with solid waste concentrations of cadmium and chromium possibly exceeding their respective 1 mg/L and 5 mg/L limits for hazardous waste under 40 CFR 261. Cadmium and chromium removal can also be carried out with gravity sedimentation after addition of lime or sulfites. The soluble hexavalent chromium ion (chromate, chromic acid) needs to be reduced to the insoluble trivalent ion (chromium oxide, chromic hydroxide) to facilitate effective precipitation. The good removal efficiency seen in the jar tests indicates the chromium may already be in the trivalent oxidation state, possibly reduced by the relatively high iron concentration found in the water. Sufficient alkalinity was present to preclude lime addition. Additionally, if the waste fails the EP toxicity test for chromium alone, the waste may be excluded from being a hazardous waste, if the chromium is primarily in the trivalent ionic state.

D. Kent County, by regulating the discharge at Site 4, and at Pump Station 6 has, in fact, imposed stringent pretreatment standards on the base since they do not consider the sizable dilution of the domestic wastewater as partial or complete substitute for adequate treatment. The 10 December 85 Kent County letter (Atch 4) to the base states that Dover AFB does not fall into an EPA categorical standard and therefore the Federal priority pollutant limitations do not apply. Their concern at a local level is based on three reasons:

1. Toxicity testing may soon become part of NPDES permits.

2. County personnel working at Pumping Station 6 may be subjected to fumes emanating from the wastewater channel which may contain priority pollutants.

3. Base personnel maintaining industrial lift stations or working downstream of the base industrial system may be subjected to fumes from the wastewater.

a. Using Henry's Law to calculate volatile organic concentrations from the wastewater channel from their vapor pressures, neither concentrations nor exposure times would be great enough to be a significant health problem for either county or base personnel (See Attachment 13).

b. Aquatic toxicity testing using both vertebrates and invertebrates is being included more frequently as part of NPDES permit monitoring for Air Force wastewater treatment plants. It is conceivable that Kent County would impose this type of requirement on the Site 4 discharge. The effects of the cadmium and chromium concentrations at Site 4 would probably be seen if the NPDES toxicity testing of the effluent were performed using the invertebrate Daphnia, as Daphnids are more sensitive to these metals than the organics. Cadmium and chromium concentrations of 24-118 and 455 micrograms/liter, respectively, have been shown to be toxic to 50% of the test organisms (LC50). Acute toxicity to various chemicals is given in Attachment 15.

c. Whereas the base would most probably meet their effluent standards at Pump Station 6, unless pretreatment for cadmium and chromium or change in waste collection practices take place, the base probably will fail to meet the imposed pretreatment standard at Site 4.

E. Leaching from the oil and sludge left in the lift station sumps contribute to the daily pollution loading by increasing concentrations of metals, oils and grease, and methylene chloride at Site 4.

F. The base has an active hazardous waste program. All shop personnel contacted appeared to be acutely aware of the importance of proper disposal and containment of chemical waste. Obviously, there have been many recent procedural and engineering changes preventing conscious and unconscious disposal of chemical waste into the industrial sewer system. Mr Witmer, Base Environmental Coordinator, and Capt Waterhouse, Base Bioenvironmental Engineer, are aggressively seeking every opportunity to reduce the industrial waste discharged into the industrial sewer system.

G. Since a large portion of the waste streams are spent solvents, the base is trying to procure two solvent recovery systems for MEK, PD-680 Type II, thinners, and toluene. The system being considered is the RX-35 System manufactured by the Recyclene Products, Inc., 1910 Trade Zone Blvd., San Jose, California 95131, (408) 945-8600.

H. Drip pans are available or are being constructed to reduce paint stripping wastes from entering the industrial sewer system. If used conscientiously will help reduce the levels of cadmium, chromium, and methylene chloride from entering the sewer.

VI. RECOMMENDATIONS

A. Remove the sludge from lift stations at buildings 719 and Site 4, and the oil and sludge from building 635 lift station. Routine sampling results should be representative of current conditions not an indication of past disposal practice.

B. The base should explore substitution of Plastic Media Blasting (PMB) for chemical paint strippers for operations where alternate paint stripping methods are permitted. In demonstrations at Hill AFB, 95% of the media is reused, 5% is disposed of as a hazardous waste. Project officer at Hill AFB is Tom Bwers, AV 458-3534.

C. Install a pretreatment process for the removal of cadmium and chromium at Site 4, since corrosion control operation effluent from various locations on base combines at Site 4. If the proper process is selected, ancillary removal of phenols, phthalates and volatiles, can be expected. For example, sedimentation with chemical addition (alum) has been reported to remove >90% of the phenol, >88% of the methylene chloride, and >94% of the di-n-butyl phthalates while removing >98% chromium and >88% of the cadmium in a full scale operation at a paint manufacturing plant.

D. Battery acid from lead-acid batteries is currently neutralized and disposed of directly into the industrial sewer system at building 636. A periodic EP toxicity test on the neutralized battery acid is necessary to document that the levels of metal, particularly lead, do not exceed the EP toxic level established by the state hazardous waste program.

E. A solvent recovery system in theory is attractive and should reduce the quantity of hazardous waste solvents in the long run if properly managed and used. The Navy is already using solvent recovery systems successfully at some of their installations, e.g., the paint shop at the Norfork Naval Shipyard. However, many solvent recovery systems are commercially available and to evaluate the cost effectiveness of any particular system, e.g., RX-35, based on a desk top study may be presumptuous. Before committing to any particular solvent recovery system, the base should negotiate a trial period with the manufacturer so the efficiency and effectiveness of the system can be properly evaluated. More importantly, the recovered solvents should be analyzed to ensure military specifications are met and are suitable for reuse without restrictions. Finally, the number of solvent recovery systems required may depend on whether plastic media blasting will be used for some paint stripping operations.

F. The planned repiping of the vats in building 719 should include the design of a dedicated piping system for each vat. This would prevent cross-contamination in the barrels caused by residuals left in the pipe. After a baseline characterization is performed, only selected spot check analysis on the drums should be required.

REFERENCES

1. APHA. Standard Methods for the Evaluation of Water and Wastewater. 16th ed., Washington, D.C.: American Public Health Association, (1985).

2. USEPA. Federal Guidelines: State and Local Pretreatment Programs, EPA 430-9-76-017a, vol. 1, P.E.7, (1977).

3. USEPA. Treatability Manual. Technologies for Control/Removal of Pollutants, vol.III, (1980).

4. Clark, J.W., W. Viessman, Jr. and M. J. Hammer. Water Supply and Pollution Control. New York: Harper & Row, Publishers, (1977)

Attachment 1
Chemical Usage During Survey

CHEMICAL USAGE DURING SURVEY

BUILDING 582

SHOP: AERIAL PORT — SHOP CONTACT: MR K. BRAGG (AV 455-6895)

CHEMICAL:	DATE USED:
815-MX	3 MAR

BUILDING 635

SHOP: ALLIED TRADES — SHOP CONTACT: MR F. WEAVER (AV 455-7222)

CHEMICAL:	DATE USED:
6011 WELDING ELECTRODE	24,25,26,27 FEB; 3 MAR
ACID CORE SOLDER	25 FEB; 3 MAR
YELLOW BRASS ROD	26,28 FEB
ENAMEL THINNER	26 FEB; 4 MAR
ADHESIVE RUBBER	3 MAR
HYDROCHLORIC ACID	25 FEB; 3 MAR
PROPOSAL SOLVENT	24,26 FEB; 4 MAR
LACQUER THINNER	25 FEB; 4 MAR

SHOP: GENERAL PURPOSE VEHICLE — SHOP CONTACT: SSGT D. OSTRANDER (AV 455-6572)

CHEMICAL:	DATE USED:
ANTIFREEZE	25,26,27 FEB; 4 MAR
30W OIL	26,27 FEB; 3,4 MAR
10W-30 OIL	25,26 FEB
CLEANING COMPOUND WINDSHIELD	25,26,27 FEB
SPRAY DEGREASER	25,26,27,28 FEB
GREASE	25,26,27 FEB; 3,4 MAR
CARBURETOR CLEANER	26 FEB; 4 MAR
AUTOMATIC TRANSMISSION FLUID	25,26 FEB; 4 MAR
BRAKE FLUID	28 FEB; 3 MAR

BUILDING 636

SHOP: REFUEL VEHICLE MAINTENANCE — SHOP CONTACT: MR J. DWYER (AV 455-6771)

CHEMICAL:	DATE USED:
GRG GREASE	24 FEB
AUTOMOTIVE BRAKE FLUID	3 MAR
10W-30 OIL	24,25,27,28 FEB; 5 MAR
PD-680	28 FEB; 4,5 MAR
30W OIL	24,26,28 FEB; 4,5 MAR
815 MX	24,25,26,27,28 FEB; 3,4,5 MAR

ETHYLENE GLYCOL	27 FEB
EMULSION DEGREASER	25,27,28 FEB
JP-4	24,26,27 FEB; 3,4,5 MAR

BUILDING 719 (CONTINUE)

SHOP: GTU SHOP	SHOP CONTACT: TSGT L. OWREY (AV 455-6997)
CHEMICAL:	DATE USED:
PENETRATING OIL	24,25,26,27,28 FEB
ASSEMBLE FLUID	24,25,26,27,28 FEB
ANTISEIGE	24,25,26,27,28 FEB
RED RTU SEALANT	24,26 FEB
LAYOUT DYE BLUE	25,28 FEB; 1 MAR
RTV SILICON RUBBER	25,28 FEB
ISOPROPYL ALCOHOL	24,25,26,27,28 FEB
XVD-40	24,25,26,28 FEB
MAGNAFLUX CLEANER REMOVER	24,25,26,27,28 FEB
RTU 8111	26,27,28 FEB
7808 OIL	26,27 FEB
WHITE PETROLEUM LUBRICANT	24,25,26,27,28 FEB
JP-4	24,25,26,27,28 FEB
OIL	24,27 FEB

BUILDING 721

SHOP: PAINT SHOP	SHOP CONTACT: MSGT J. PERRINE (AV 455-6556)
CHEMICAL:	DATE USED:
MEK	24,25,26,27,28 FEB; 1,2 MAR
DOPE AND LACQUER THINNER	24,25,26,27,28 FEB; 1,2 MAR
TOULENE	24,25,26,27,28 FEB; 1,2 MAR
POLYURETHANE THINNER	24,25,26,27,28 FEB; 1,2 MAR

BUILDING 724

SHOP: METAL PLATING AND WELDING	SHOP CONTACT: MSGT C. JACKSON (AV 455-6857)
CHEMICAL:	DATE USED:
ELECTRODE 6010	24,25,26,27,28 FEB
ELECTRODE 6013	24,25,26 FEB
SILVER SOLDER	28 FEB
ALUMINUM FILLER ROD	24,25,26,27,28 FEB
TITANIUM	24,25,26,27,28 FEB

SHOP: MACHINE SHOP	SHOP CONTACT: MSGT V. WHITE (AV 455-6856)
CHEMICAL:	DATE USED:
PD-680 TYPE II	NOTE: SMALL QUANTITY USED ON A CONTINUAL BASIS. TRACKING DAILY USAGE OF CHEMICALS USED IN THIS SHOP WAS NOT NECESSARY.

BUILDING 725

SHOP: ENGINE SHOP	SHOP CONTACT: MSGT S.COOK (AV 455-6914)

NOTE: CHEMICAL INVENTORY FOR THIS SHOP WAS NOT NECESSARY.

BUILDING 706

SHOP: AIRCRAFT WASHRACK	SHOP CONTACT: MR T. NGUYEN (AV 455-7502)
CHEMICAL:	DATE USED:
CALLA 800 SOAP	25 FEB; 1 MAR
PD-680	25 FEB; 1 MAR

BUILDING 719

SHOP: CLEANING ROOM	SHOP CONTACT: MSGT T. LAPINSKI (AV 455-6997)
CHEMICAL:	DATE USED:
815 MX DESCALING COMPOUND PD-680 KEROSENE EPOXY 3 POLYURETHANE PAINT REMOVER	NOTE: THESE CHEMICALS ARE USED IN THE SHOP ON A CONTINUAL BASIS. MSGT LAPINSKI DID NOT TRACK DAILY USAGE.

SHOP: COMPONENTS REPAIR	SHOP CONTACT: MSGT T. LAPINSKI (AV 455-6997)
CHEMICAL:	DATE USED:
COLD CARBON REMOVER CALIBRATION FLUID TRICHLOROETHANE EA 934 (PART A) EA 934 (PART B) LUBRICANT SOLID FILM ADHESIVE TYPE I	NOTE: THESE CHEMICALS ARE USED IN THE SHOP. MSGT LAPINSKI DID NOT TRACK DAILY USAGE.

SHOP: MODULES AND ACCESSORY REPAIR	SHOP CONTACT: MSGT T. LAPINSKI (AV 455-6997)
CHEMICAL:	DATE USED:
PD-680 TYPE II FINGERPRINT REMOVER SYNTHETIC ENGINE OIL	NOTE: THESE CHEMICALS ARE USED IN THE SHOP. MSGT LAPINSKI DID NOT TRACK DAILY USAGE.

SHOP: NONPOWERED AGE PROPULSION	SHOP CONTACT: MSGT T. LAPINSKI
CHEMICAL:	DATE USED:
FLAT BLACK SPRAY PAINT	NOTE: THESE CHEMICALS ARE USED IN THE SHOP. MSGT LAPINSKI DID NOT TRACK DAILY USAGE.
RED LACQUER SPRAY PAINT	
WHITE LACQUER SPRAY PAINT	
YELLOW SPRAY PAINT	
HYDRAULIC FLUID FIRE RESISTANT	
BRAKE FLUID	
GREASE AUTOMOTIVE AND ARTILLERY	
OLIVE DRAB SPRAY PAINT	
ALL PURPOSE CLEANER	

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Attachment 2
Delaware Sampling Results

ATCH 2

TECHNICAL SERVICES SECTION
DIVISION OF ENVIRONMENTAL CONTROL
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL
REQUEST FOR LABORATORY ANALYSIS

DATE SAMPLED June 5, 1985 SAMPLER William P. Parker CAR /✓/ BOAT /__/ SPLIT /__/

REQUESTER Kent County Engineering RESULTS TO Kent County Engineering

SAMPLE TYPE: STREAM ___ WELL ___ DOMESTIC WASTE ✓ INDUSTRIAL ✓ AIR ___

BIOLOGICAL ___ SLUDGE ___ BORING ___ STP ___ OTHER ___

SOURCE NAME Dover Air Force Base NPDES DE - ___

ADDRESS ___

SAMPLING MODE GRAB /__/ COMPOSITE MFG. ___ S/N ___

FROM: YR 85 MO 6 DAY 4 HR 9:00

BASIN ___ TO: YR 85 MO 6 DAY 5 HR 9:00

TIDE ___ THIO ADDED TO ___

COMMENTS/INSTRUCTION ___

LOG. NO.	SAMPLE IDENTIFICATION	TIME	TEMP., °C. WTR	TEMP., °C. AIR	Cl_2 Res.	SECCHI IN.	FLOW	DEPTH, FT.
1339	Dover Air Force Base	24 hr	23°C					
1340	BLANK							

DATE & TIME ACCEPTED June 5, 1985 0925 ACCEPTED BY [signature]

APPROVED BY [signature]
(Laboratory Supervisor)

APPROVED BY Harry W. Otto
(Laboratory Manager)

DATE 6/18/85

COST CENTER				
AP	RC	PE	FF	
NP	DSW		FW	
WS	DR	[initials]		

DOCUMENT NO. 40-08/01/10/81

ANALYSIS REQUEST

LABORATORY LOG NO.	1639	1640						
% SATURATION								
DIS. OXYGEN, mg/l								
BOD, mg/l	>414	<2.4						
COD, mg/l	1272	0						
COLOR, UNITS								
TURBIDITY, FTU								
SPEC. COND., umhos/cm								
pH								
ALK., mg/l $CaCO_3$								
ACIDITY, mg/l $CaCO_3$								
HARDNESS, mg/l								
CHLORIDE, mg/l								
T. NITROGEN, mg/l	21.3	<0.10						
ORGANIC N., mg/l								
AMMONIA N., mg/l								
NITRITE N., mg/l								
NITRATE N., mg/l								
SULFATE, mg/l SO_4								
TOTAL PHOSPHORUS, mg/l								
SET. SOLIDS, ml/l								
T. SUSP. SLDS., mg/l	38	1						
N.V. SUSP. SLDS., mg/l								
V. SUSP. SLDS., mg/l								
TOTAL SOLIDS, mg/l								
N. V. T. SLDS., mg/l								
VOL. TOT. SLDS., mg/l								
T. DIS. SLDS., mg/l								
% MOISTURE								
Cyanide, mg/l	<1	<1						
GREASE, mg/l	3.1	0.0						
PHENOL, ug/l	6640	<10						
TOC mg/l	763	15						
IRON, ug/l	1245	<100						
COPPER, ug/l	<100	<100						
MANGANESE, ug/l	370	<100						
CHROMIUM, ug/l	600	<100						
SILVER, ug/l	<100	<100						
CALCIUM, ug/l	21800	<100						
ZINC, ug/l	330	<100						
LEAD, ug/l	220	<100						
NICKEL, ug/l	<100	<100						
CADMIUM, ug/l	<100	<100						
MERCURY, ug/l	<1.0	<1.0						
ARSENIC, ug/l	<30	<30						
SELENIUM, ug/l	<5	<5						
Magnesium ug/l	4850	150						
Barium ug/l	<100	<100						
T. COLIFORM, #/100 ml								
F. COLIFORM, #/100 ml								
F. STREP., #/100 ml								

PARAMETER VOLATILE ORGANICS	UNITS		1639	(CHECK) 1639	(blank) 1640
Benzene	ug/l		240.	140.	<2.
Tolvene			360.	240	
Chlorobenzene			24.	10.	
Ethylbenzene			24.	19.	
1,1-dichloroethene	ug/l		1.0	1.0	<1.0
1,1-dichloroethane			70.	84.	
1,2-trans-dichloroethene			<1.0	<1.0	
chloroform			4.2	4.1	
1,2-dichloroethane			1.5	1.3	
1,1,1-trichloroethane			1200	1400	2.1
trichloroethene			440	650	1.0
tetrachloroethene			98	100	<1.0
1,1,2,2-tetrachloroethane			<1.0	<1.0	<1.0
BASE NEUTRAL EXTRACTABLES					
bis(2-chloroethyl) ether	ug/l		4100	1600	<10.
bis(2-chloroisoproplyl) ether			2900	3800	
N-nitroso-d-n-proplyamine			960	1300	
bis(2-chloroethopyl) methane			2100	3400	
di-N-butyl phthalate			<10.	<10.	
bis(2-ethylhexyl) phthalate					
chrysene					
di-n-octylphthalate					
benzo(b)fluoronthene					
pyrene					
ACID EXTRACTABLES					
2-chlorophenol	ug/l		220	190	<10.
2-netrophenol			130.	110	
pentachlorophenol – wood			4000	1400	
2,4-dinitrophenol			<10.	<10.	
2-methyl-4,6-dinitrophenol			<10.	<10.	
2,4-dimethylphenol			<10.	<10.	

Attachment 3
DAFB Industrial Wastewater Discharge Permit

Kent County

OFFICE OF THE COUNTY

County Engineer

WILLIAM C. HENRY, P.E.
COUNTY ENGINEER

COUNTY ADMINISTRATION BUILDING
414 FEDERAL STREET
DOVER, DELAWARE 19901
HANDICAPPED ACCESSIBLE
736-2101

December 10, 1985

Base Hospital/SGPB
Dover Air Force Base
Dover, Delaware 19902

Attn: Capt. Lindsey Waterhouse

Ref: DAFB Industrial Wastewater Discharge Permit

Gentlemen:

Colonel Richard B. Harper's letter regarding directed actions to be taken to reduce industrial discharges to the Kent County Wastewater Facilities has been reviewed and it is agreed that these are positive steps being taken by the Base to reduce the industrial discharges. We strongly recommend these actions be completely carried out and emphasized with all Base personnel. In order to monitor progress along these lines the enclosed industrial wastewater discharge permit has incorporated a schedule which it is forecasted that the Base will be able to meet if the actions are implemented successfully with Base personnel. Please have the Base Commander sign the permit, make a copy for your file and return the permit to this office by January 1, 1986.

There are three additions to this permit and each will be discussed individually.

1. The industrial discharge site is referenced specifically as a designated site as this is the location where all industrial wastes combine and enter the sanitary sewer.

2. The Base is required to reimburse the County for a yearly priority pollutant analysis. The County recovers all standard costs incurred in the pretreatment program through County-wide user fees and any extra costs above the standard costs are billed specifically to the industry. The priority pollutant scan is considered an extra cost as the Base was the only contributor determined to be a significant priority pollutant discharger during the testing completed in June, 1985.

3. The schedule of compliance incorporates the Bases' objectives in reducing the industrial wastes as previously stated.

Dover Air Force Base
Attn: Capt. Lindsey Waterhouse
Ref: DAFB Industrial Wastewater
Discharge Permit

December 10, 1985

The Base is a unique industrial contributor in that a significant amount of priority pollutants have been seen in the Base industrial flow; however, the Base does not fall into an EPA categorical standard and therefore the Federal priority pollutant limitations do not apply. At the local level these pollutants remain a concern for several reasons:

1. As the enclosed letter from the Director of EPA Permits Division to NPDES State Directors dated July 24, 1985 indicates, toxicity testing may soon become a part of NPDES permits.

2. County personnel working at Pumping Station No. 6 may be subjected to fumes emanating from the wastewater channel which may contain priority pollutants.

3. Base personnel maintaining industrial lift stations or working down stream of the Base industrial system may be subjected to fumes from the wastewater.

At the present time there are no local limits for priority pollutants; however, if the above stated reasons necessitate limits, then the appropriate limits would be instated.

We ackowledge that the Base has made recent strides towards reducing the ~~industrial~~ discharges and hope that continued efforts are strongly implemented in these matters.

Very truly yours,

John Wolfenden

John Wolfenden
Hydraulic Engineer

JW:lm
Eng.
cc: Donald Witmer
William C. Henry, P. E.

PERMIT NO. 6

KENT COUNTY LEVY COURT

OFFICE OF THE COUNTY ENGINEER

414 FEDERAL ST., DOVER, DELAWARE 19901

INDUSTRIAL WASTEWATER DISCHARGE PERMIT

In accordance with all terms and conditions of the Kent County Sanitary Code, and also with any applicable provisions of Federal or State law or regulation; permission is hereby granted to:

Department Of The Air Force

Dover Air Force Base

Dover, Delaware 19902

for the discharge of industrial wastewater to the Kent County Regional Sewage Disposal District at the location designated as

Total DAFB Flow - Kent County Pumping Station #6, Lebanon Road -

DAFB Industrial Flow - DAFB site #4, industrial wastewater pumping station

This permit is granted in accordance with the application filed on

Feb 23, 1985

and in conformity with plans, specifications and other data submitted to the County in support of the above application, all of which are filed with and considered part of this permit, together with the following named conditions and requirements.

Effective Date: January 1, 1986

Expiration Date: January 1, 1989

Date: ______ Signed ______

Permittee, Title

Date: 9 Dec 1985 Signed William C. Henry

Kent County Engineer

PERMIT NO. 5

Wastewater Discharge Limitations

The discharge from the designated location shall be limited to the effluent quality limitations as defined in Sections 340 - 344 of the Kent County Sanitary Code with the following additions:

Effluent Parameter	Maximum Concentration: 24 Hour Flow Proportioned Composite	Maximum Instantaneous
Arsenic	0.1	At no time shall the hourly concentration of the discharge exceed three times the average concentration.
Barium	4.0	
Cadmium	0.03	
Chromium-total	0.5	
Copper	1.0	
Lead	1.0	
Mercury	0.01	
Nickel	0.50	
Selenium	0.50	
Silver	0.2	
Zinc	3.00	
Cyanide-total	1.50	
Phenol	4.0	

Monitoring Requirements

The permitted discharge shall be monitored by the permit holder in compliance with the following schedule:

Effluent Parameter		Monitoring Requirements: Measurement Frequency	Sample Type
Industrial Wastewater Pumping Station			
Site #4	COD	Quarterly	24 Hr. Composite
	Phenol	Quarterly	24 Hr. Composite
	Chromium	Quarterly	24 Hr. Composite
	Cadmium	Quarterly	24 Hr. Composite
	Lead	Quarterly	24 Hr. Composite
	Copper	Quarterly	24 Hr. Composite
	Mercury	Quarterly	24 Hr. Composite
	Zinc	Quarterly	24 Hr. Composite
	Oil and Grease	Quarterly	Grab
	EPA Priority Pollutant Scan	Semi-Annually	24 Hr. Composite except for purgeable organics which will be a grab sample

2.

PERMIT NO. 6

Monitoring Requirements Cont'd

Effluent Parameter		Monitoring Requirements: Measurement Frequency	Monitoring Requirements: Sample Type
Total DAFB Flow	Site #7		
BOD		Quarterly	24 Hr. Composite
TSS		Quarterly	24 Hr. Composite
Phenol		Quarterly	24 Hr. Composite
Chromium		Quarterly	24 Hr. Composite
Cadmium		Quarterly	24 Hr. Composite
Lead		Quarterly	24 Hr. Composite
Copper		Quarterly	24 Hr. Composite
Mercury		Quarterly	24 Hr. Composite
Zinc		Quarterly	24 Hr. Composite
Oil and Grease		Quarterly	Grab
pH		Quarterly	24 Hr. Composite

The above required analyses for site #4 and #7 shall be submitted to the County Engineer's Office on a quarterly basis.

The County Engineer's Office will also complete yearly industrial monitoring as outlined in the Kent County Pretreatment Program. This monitoring normally includes BOD, TSS and heavy metals.

The County monitoring of the Dover Air Force Base industrial discharge will include the normal parameters, however, based upon the sample taken in June, 1985 by this office, a yearly priority pollutant scan will also be completed by this office. The cost of the priority pollutant scan will be billed directly to the Dover Air Force Base and will be itemized on the Dover Air Force Base sewer bill.

PERMIT NO. 6

All analyses shall be performed in accordance with the latest edition of the following references:

STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATERS, 16th Edition, 1980, American Public Health Association, Washington, D. C. 20005.

W.Q.O. METHODS FOR CHEMICAL ANALYSIS OF WATER AND WASTES, April, 1971, Environmental Protection Agency, Water Quality Office, Analytical Quality Control Laboratory, NERC, 1014 Broadway, Cincinnati, Ohio, 45268.

Schedule of Compliance

April 1986 - Commence OEHL study to evaluate source of priority pollutants in industrial waste system.

April 1986 - Limit chromium discharge at site #4 to below 0.5 mg/l.

June 1986 - Limit phenol discharge at site #4 to below 4.0 mg/l.

Rate and Time of Discharge

The average production day flow permitted for discharge at the designated location shall not exceed 1.0 MGD.

The maximum hourly discharge flow rate shall not exceed 104,000 gpl.

PERMIT CONDITIONS

General

In consideration of the granting of this permit the undersigned agrees:

1. To furnish any additional information relating to the installation

PERMIT CONDITIONS Cont'd

or use of the industrial sewer for which this permit is sought as may be requested by the County Engineer.

2. To accept and abide by all provisions of the Kent County Sanitary Code and of all other pertinent local laws or regulations that may be adopted in the future.

3. To operate and maintain any waste pretreatment facilities, as may be required as a condition of the acceptance into the public sewer of the industrial wastes involved, in an effecient manner at all times, and at no expense to Kent County.

4. To cooperate at all times with the County Engineer and his representatives in their inspecting, sampling, and study of the industrial wastes, and any facilities provided for pretreatment.

5. To notify the County Engineer immediately in the event of any accident, negligence, or other occurrence that ocassions discharge to the public sewers of any wastes or process waters not covered by this permit.

Right of Entry

The permittee shall allow duly authorized employees or representatives of the County to enter the permittee's premises for the purpose of inspection, observation, measurement, sampling, and testing in accordance with Section 300 of the Kent County Sanitary Code.

Sampling Manhole Requirements

If, in the opinion of the County Engineer, there are not adequate facilities for the acquisition of representative samples and accurate flow measurements, the County Engineer can require that a sampling manhole with a flow measuring device be installed by the permittee at his expense. This sampling manhole shall be approved by this office before installation. The permittee shall be responsible for all maintenance of the sampling manhole and calibration of the monitoring equipment.

Change in Wastewater Discharge

All discharges authorized herein shall comply with the terms and conditions of this permit. Any industrial facility expansions, production increases or process modifications which result in new, different or increased discharges of pollutants must be reported by submission of a new industrial waste disposal questionnaire. This permit may be modified to specify and limit any pollutants not previously limited. The discharges of any pollutant more frequently than or at a level in excess of that specified and authorized by this permit shall constitute a violation of the terms and conditions of this permit.

PERMIT NO. 6

Permit Modifications

After sufficient notice to the permittee, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:

(a) Violation of any terms or conditions of this permit.

(b) A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

(c) If an effluent standard is established under any State or Federal law for a pollutant which is present in the discharge and such standard or prohibition is more stringent than any limitation for such pollutant in this permit.

Notice of Non-compliance

In the event the permittee does not comply with or will be unable to comply with any daily maximum effluent limitation specified in this permit due to:

(1) Breakdown of industrial wastewater pretreatment equipment.

(2) Accidents caused by human error or negligence; or

(3) Other causes, such as acts of nature.

The permittee shall notify the operator of the Kent County Wastewater Treatment Plant immediately by telephone so that the operator can take the necessary steps to prevent damage to the wastewater treatment process and equipment. The County Engineer shall be notified in writing within five (5) days and shall include the following pertinent information:

(1) Cause of non-compliance.

(2) A description of the non-complying discharge.

(3) Anticipated time and condition of the non-compliance is expected to continue, or if such condition has been corrected, the duration of the period of non-compliance.

(4) Steps taken by the permittee to reduce and eliminate the non-complying discharge; and

(5) Steps to be taken by the permittee to prevent recurrence of the condition of non-compliance.

Nothing in this permit shall be construed to relieve the permittee from the penalties for non-compliance of this permit for any reason subject to the Kent County Sanitary Code.

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Attachment 4
Site #4 Flow

Dover AFB Site 4 Flow

Date	Times	Flow (gal) by Cycles	by Chart time
26 Feb	1430-2400	6,938	7,875
27 Feb	0001-0930	5,204	6,825
28 Feb	0930-2400	13,344	14,175
01 Mar	0001-0500	5,782	6,300
01 Mar	0900-2300	10,407	11,5[illegible]
02 Mar	1000-2400	10,413	11,02[illegible]
03 Mar	0900-2400	12,720	14,175
04 Mar	0001-2400	13,298	13,650
05 Mar	0001-0630, 0900-2400	28,910	30,450
06 Mar	0001-2400	23,128	25,725
07 Mar	0001-0900	4,047	5,250

Attachment 5
Sample Sites with Detectable Metal Concentrations

SAMPLE SITES WITH DETECTABLE METAL CONCENTRATIONS AT DOVER AFB

Sample Sites (Conc. in μg/L)

Substance	0006	0008	0009	0010
Arsenic	3.0	7.0	2.0	41
Barium	25	27	7.0	28
Cadmium	122	21.6	0.4	370
Total Chromium	20	119	6.0	2480
Copper	103	56	8.0	226
Iron	1700	800	2300	2900
Lead	32	206	9.0	410
Manganese	42.4	54	53	46.5
Mercury	<0.2	<0.1	<0.1	<0.1
Nickel	52	<3.0	<3.0	85
Selenium	<1.0	<1.0	<1.0	<1.0
Silver	<0.2	1.0	0.4	2.2
Zinc	220	290	30	870
Calcium	25400	20500	19300	22900
Magnesium	7590	6930	6490	7050
	0012	0013	0014	0015
Arsenic	3.0	5.0	<50	6.0
Barium	1210	42	1050	21.4
Cadmium	35.7	17.8	345	211.3
Total Chromium	285	22	400	194.6
Copper	73	58	3350	72.7
Iron	2200	2700	15000	1743
Lead	48	263	14900	88.7
Manganese	34	55.5	335	57
Mercury	0.1	<0.1	20	0.11
Nickel	5.0	<3.0	150	16.6
Selenium	<1.0	<1.0	50	2.1
Silver	2.4	0.7	15	1.1
Zinc	340	440	21500	274
Calcium	29800	24600	106000	23500
Magnesium	14100	8200	31000	6600

	0016	0017	0018
Arsenic	5.3	5.0	6.0
Barium	28.1	82	33
Cadmium	3.3	12.5	18.5
Total Chromium	4.86	7.0	20
Copper	39.4	332	39
Iron	257	16400	1600
Lead	11.7	106	67
Manganese	21.3	209	36.8
Mercury	0.27	0.3	0.1
Nickel	2.1	7.0	6.0
Selenium	2.1	<1.0	<1.0
Silver	3.9	3.5	1.3
Zinc	111.4	580	340
Calcium	22200	34200	20400
Magnesium	6850	10700	5700

*Note: Concentrations given for sites 0015 and 0016 are 7-day averages.

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Attachment 6
Sampling Results for Various Parameters

SAMPLING RESULTS FOR VARIOUS PARAMETERS FOR DOVER AFB

Parameter	Sample Sites(Conc. in mg/L)			
	0006	0008	0009	0010
Total Organic Carbon	143	16	23 440	
Oil and Grease	19.3	9.8	5.0 1860	
Total Kjeldahl Nitrogen	2.0	0.5	0.2 77	
Cyanide	<0.02	<0.01	<0.01	<0.01
Phenol	.046	1.37	.07 .095	
	0012	0013	0014	0015
Total Organic Carbon	88	137	N/A 184.6	
Oil and Grease	6.7	408	N/A 83.6	
Total Kjeldahl Nitrogen	1.9	8.0	N/A 18.6	
Cyanide	<0.01	<0.01	N/A <.011	
Phenols	.041	.137	N/A .524	
	0016	0017	0018	
Total Organic Carbon	74.86	140	25	
Oil and Grease	35.5	67	22.2	
Total Kjeldahl Nitrogen	36.1	77	16	
Cyanide	<0.01	<0.01	<0.01	
Phenol	.104	.095	.030	

*Note: Concentrations given for sites 0015 and 0016 are 7-day averages.

Attachment 7
Sample Sites With Detectable Amounts of Purgeable Organics

SAMPLE SITES AT DOVER AFB WITH DETECTABLE AMOUNTS OF PURGEABLE ORGANICS

Site No.	Substance	Concentrations found (μg/L)
0014	Toluene	270
	Ethylbenzene	31
0015	Methylene chloride	11000, 10000, 21000 6200, 2800, 720
	Tetrachloroethylene	230
	Trichloroethylene	101, 150, 110
	1,1,1 Trichloroethane	9100, 900, 670
	Toluene	120, 130
	Chloroform	170
0017	1,1,1 Trichloroethane	58
0018	Benzene	19
	Toluene	75

Attachment 8

Purgeable Organics And Base/Neutral Extractables

PURGEABLE ORGANICS AND BASE/NEUTRAL EXTRACTABLES TESTED FOR AT DOVER AFB

Purgeable Organics		Base/Neutral Extractables
Acrolein	Acenaphthylene	
Acrylonitrile	Acenaphthene	
Benzene	Butyl Benzyl Phthalate	
Toluene	1,2-Dichlorobenzene	
Ethylbenzene	1,3-Dichlorobenzene	
Carbon tetrachloride		1,4-Dichlorobenzene
Chlorobenzene	Hexachloroethane	
1,2 Dichlorobenzene		Hexachlorobutadiene
1,1,1 Trichloroethane		Hexachlorobenzene
1,1 Dichloroethylene		1,2,4-Trichlorobenzene
1,3 Dichloropropene (cis)		bis (2-Chloroethoxy) methane
Chloroethane	Naphthalene	
1,1,2 Trichloroethane		2-Chloronaphthalene
1,1,2,2 Tetrachloroethane		Isophorone
2- Chloroethyl vinyl ether		Nitrobenzene
Chloroform	2,4-Dinitrotoluene	
1,2 Dichloropropene		2,6-Dinitrotoluene
1,3 Dichloropropene (trans)		4-Bromophenyl phenyl ether
Methylene chloride		bis (2-Ethylhexyl) phthalate
Methyl chloride	Di-n-butyl phthalate	
Methyl bromide	Fluorene	
Bromoform	Fluoranthene	
Dichlorobromomethane		Chrysene
Trichlorofluoromethane		Pyrene
Chlorodibromomethame		Phenanthrene
Tetrachloroethylene		Anthracene
Trichloroethylene		Benzo(a)anthracene
Vinyl chloride	Benzo(b)fluoranthene	
1,2-trans-Dichloroethylene		Benzo(k)fluoranthene
bis (Chloromethyl) ether		Benzo(a)pyrene
	Indeno(1,2,3-c,d)pyrene	
	Dibenzo(a,h)anthracene	
	Benzo(g,h,i)perylene	
	4-Chlorophenyl phenyl ether	
	3,3-Dichlorobenzidene	
	Benzidene	
	bis(2-Chloroethyl) ether	
	1,2-Diphenylhydrazine	
	Hexachlorocyclopentadiene	
	N-Nitrosodiphenylamine	
	N-Nitrosodimethylamine	
	N-Nitrosodi-n-propylamine	

Attachment 9
Organochlorine Pesticides, PCBs, and Extractables

ORGANOCHLORINE PESTICIDES, PCBs, AND ACID EXTRACTABLES TESTED FOR AT DOVER AFB

Organochlorine Pesticides and PCBs	Acid Extractables
alpha-Endosulfan	Phenol
beta-Endosulfan	2-Nitrophenol
Endosulfan sulfate	4-Nitrophenol
alpha-BHC	2,4-Dinitrophenol
beta-BHC	4,6-Dinitro-o cresol
delta-BHC	Pentachlorophenol
gamma-BHC	p-Chloro-M-Cresol
Aldrin	2-Chlorophenol
Dieldrin	2,4-Dichlorophenol
4,4-DDE	2,4,6-Trichlorophenol
4,4-DDD	2,4-Dimethylphenol
4,4-DDT	2,4,5-Trichlorophenol
Endrin	2-Methylphenol
Endrin aldehyde	4-Methylphenol
Heptachlor	Benzoic Acid
Heptachlor epoxide	
Chlordane	
Toxaphene	
Arochlor 1016	
Arochlor 1221	
Arochlor 1232	
Arochlor 1242	
Arochlor 1248	
Arochlor 1254	
Arochlor 1260	

Attachment 10
Sample Sites with Detectable Amounts of Base/Neutral and Acid Extractables

SAMPLE SITES AT DOVER AFB WITH DETECTABLE AMOUNTS OF BASE/NEUTRAL AND ACID EXTRACTABLES

Site No.	Substance	Concentrations found(μg/L)
0006	bis (2-Ethylhexyl) phthalate	280
0008	2-Chlorophenol	130
	2,4,6-Trichlorophenol	480
	2,4,5-Trichlorophenol	360
0009	Di-n-butyl phthalate	29
0012	Di-n-butyl phthalate	24
	4-Methylphenol	35
0015	2,4,6-Trichlorophenol	150, 170, 53, 31
	2,4-Dimethylphenol	130
	Di-n-butyl phthalate	33, 45
	2,4,5-Trichlorophenol	140, 18, 30
	1,2-Dichlorobenzene	22
	bis (-Ethylhexyl) phthalate	201
0016	Di-n-butyl phthalate	44, 120, 98, 94
	4-Methylphenol	20, 18, 23, 56, 22
	Diethyl phthalate	11, 16, 14
	Phenol	39

Attachment 11

Results for pH, Temperature, COD, Suspended Solids, and BOD

DOVER AFB RESULTS FOR pH, TEMPERATURE, CHEMICAL OXYGEN DEMAND (COD), SUSPENDED SOLIDS, AND BIOCHEMICAL OXYGEN DEMAND (BOD)

Samp	Date	pH	Temp(C)	COD mg/L	SS mg/L	BOD mg/L
0006	26 Feb	7.31	20.2	350 20	119	
0008	28 Feb	8.01	21.7	80 9.0	NR	
0009	5 Mar	7.80	19.3	200 18	18.9	
0010	4 Mar	9.61	16.4	1600	248	925
0012	4 Mar	7.98	19.2	340 29	60.6	
0013	1 Mar	8.57	12.7	550 119	84.1	
0014	3 Mar	NR	13.2	86000	NR	36502
0015	26 Feb	8.09	11.1	840 44	252	
0015	27 Feb	8.41	18.4	820 37	314.3	
0015	28 Feb	8.25	11.9	720 31	337	
0015	1 Mar	7.48	11.0	480 12	218.6	
0015	2 Mar	7.43	9.1	500 19	28	
0015	3 Mar	7.57	7.6	550 32	61.6	
0015	4 Mar	7.98	14.8	700 26	127.5	
0015	5 Mar	7.6	5.4	NR 29	129	
0016	26 Feb	8.03	14.8	349 204	NR	
0016	27 Feb	NR	NR	325 NR	57.7	
0016	28 Feb	7.70	16.1	300 92	84	
0016	1 Mar	7.82	13.1	320 36	83	
0016	2 Mar	7.75	10.4	290 33	83.5	
0016	3 Mar	7.80	10.3	680 57	64	
0016	4 Mar	7.81	14.8	340 106	84.5	
0016	5 Mar	7.84	18.3	350 53	145.-5	
0017	27 Feb	8.43	16.2	300 342	76.5	
0018	28 Feb	7.72	13.6	100 25	32.5	

Attachment 12
Coagulation and Sedimentation Test

DOVER AFB COAGULATION AND SEDIMENTATION TEST

Metals	0019 (control)	(150 mg/L) 0020	%Reduction	(200 mg/L) 0021	%Reduction
pH	7.67				
Arsenic	2.0 µg/L	<1.0	50%	1.0	50%
Cadmium	19.9	0.7	96.5%	1.0	95%.
Chromium	32.0	1.0	96.9%	2.0	93.75% .
Copper	39.0	16.0	59%	103	-264%
Lead	32.0	11.0	65.6%	12.0	62.5%
Mercury	<0.4	same	N/A	same	N/A
Nickel	29.0	25.0	13.8%	833	-2872%
Selenium	<1.0	1.0	N/A	1.0	N/A
Silver	0.5	0.4	20%	0.4	20%
Zinc	190	70.0	63.2%	80.0	57.9%
Antimony	<.002mg/L	same	N/A	same	N/A
Beryllium	<.0001 mg/L	same	N/A	same	N/A
Thallium	<.006 mg/L	same	N/A	same	N/A

	0022 (control)	(130 mg/L) 0023	%Reduction
pH	7.03		
Arsenic	4.0	2.0	50%
Cadmium	52.8	3.9	92.6%
Chromium	42.0	2.0	95.2%
Copper	54.0	12.0	77.8%
Lead	49.0	21.0	57.2%
Mercury	<0.2	same	N/A
Nickel	46.0	27.0	41.3%
Selenium	2.0	1.0	50%
Silver	7.6	0.3	96.1%
Zinc	210	130	38.1%
Antimony	<.002 mg/L	same	N/A
Beryllium	<.0001	same	N/A
Thallium	<.006	same	N/A

	0024 (control)	(200 mg/L) 0025	%Reduction
Arsenic	3.0	1.0	66.7%
Cadmium	85.2	28.6	66.4%
Chromium	346	165	52.3%
Copper	86.0	61.0	29.1%
Lead	67.0	44.0	34.3%
Mercury	<0.2	same	N/A
Nickel	17.0	61.0	-359%
Selenium	1.0	1.0	0%
Silver	0.7	0.3	57.2%
Zinc	320	300	6.2%
Antimony	<.002	same	N/A
Beryllium	<.0001	same	N/A
Thallium	<.006	same	N/A

DOVER COAGULATION AND SEDIMENTATION STUDY SUSPENDED SOLIDS
RESULTS

Sample No.	Alum Conc.(mg/L)	SS Conc.(mg/L)	%Reduction
0019	control	10.0	74%
0020	150.0	2.6	70%
0021	200.0	3.0	
0022	control	36.0	
			100%
0023	130.0	0.0	
0024	control	63.0	99.6%
0025	200.0	0.27	

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Attachment 13

Calculations For Methylene Chloride and 1,1,1 TCE Vapors

ATMOSPHERIC CONCENTRATION CALCULATIONS FOR METHYLENE CHLORIDE AND 1,1,1 TRICHLOROETHANE

From Purgeable Organic Results for 2/28/86:

1,1,1 Trichloroethane = 9.1 mg/L
Methylene Chloride = 21.0 mg/L

Molarity:

Methylene Chloride-- .021 gr/1/84.94 gr/mole = 2.47E-4 moles/L

1,1,1 Trichloroethane-- .0091 gr/L/133.4 gr/mole = 6.82E-5 moles/L

Partial Pressures:

MC-- 2.47E-4 moles/l * 3.19E-3 atm m**3/mole * 1000L/m**3

= 7.88E-4 atm

1,1,1-- 6.82E-5 moles/l * 4.92E-3 atm m**3/mole * 1000L/m**3

= 3.36E-4 atm

**Note- Second term in previous two calculations is the Henry's Constant for the particular substance

Now for;

MC-- 7.88E-4 atm * 760 torr/atm = .599 torr

1,1,1-- 3.36E-4 atm * 760 torr/atm = .255 torr

TOTAL= .599 + .255 = .854 torr

% of Total Pressure:

= .854 torr/760 torr * 100 = .11% = 1100 ppm

Attachment 14
Hazardous Waste Management Survey Forms

DOVER AFB

PAGE 1 OF 3

SHOP NAME: Aerial Port

BUILDING: 582

DATE: 24 FEB 85

SHOP SUPERVISOR: Mr. Bragg, Kenneth

AV: 455 - 6895

SUBSTANCE		AMOUNT USED/DAY M	T	W	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
815MX Industrial Cleaner	AM	3 March 18T.									
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										

DOVER AFB

PAGE 1 OF 2

SHOP NAME: ALLIED TRADES

BUILDING: 636

DATE: 25 Feb 86

SHOP SUPERVISOR: Mr. Weaver FRANKLIN

AV: 455-7222 Com 678-6309

SUBSTANCE		AMOUNT USED/DAY M (24 Feb)	T (25 Feb)	W (26 FEB)	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
6011 WELDING ELECTRODE 3439-00-262-2652	AM		3 rods							SomeTimes	Dumpster
	PM	5 rods		5 rods						Sometimes	
ACID CORE SOLDER 3434-00-247-6961	AM		Small amount							Yes	None
	PM									Yes	
EUTECTIC CORP YELLOW BRASS ROD 3439-00-027-0948	AM			1 rod						SomeTimes	Dumpster
	PM									SomeTimes ~~No~~	
JAEGLE PAINT COMP. ENAMEL GREEN PAINT 8010-P-240-62	AM									No	None
	PM									No	
CSD CONNOE ENAMEL THINNER 8010-00-160-5794	AM									No	Waste Thinner barrel at Corrosion shop FMS (Bldg 721)
	PM			1 pt.						No	Placed into drum for waste thinner
WOOD PRESERVER 8030-00-634-7970	AM									No	None
	PM									No	
ADHESIVE RUBBER BASE 8040-00-282-9011	AM									No	None
	PM									No	
6013 WELDING ROD 3439-00-287-4787	AM									Sometimes	Dumpster
	PM									Sometimes	
HACLICK BLEACH CO HYDROCHLORIC ACID	AM		Small amount							Yes	Drain After used on Radiator Flush w/water
	PM									Yes	

DOVER AFB

PAGE 2 OF 2

SHOP NAME: ALLIED TRADES

BUILDING: 6J6

SHOP SUPERVISOR: Mr. Weaver

DATE: 25 Feb 86

AV: 455-7272 or Com 678-6307

SUBSTANCE		AMOUNT USED/DAY M 24 Feb	T 25 Feb	W 26 Feb	T ~~[illegible]~~	F ~~[illegible]~~	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
E.I DUPONT PREPSOL SOLVENT 8010-P-39195	AM			Small amount on rag						No	None rags in Dumpster
	PM	Small amount on rag								No	
~~[illegible]~~	AM									~~[illegible]~~	
	PM									~~[illegible]~~	
Lacquer Thinner 8010-00-160-5787	AM									No	waste Thinner barrel at Corrosion shop
	PM		1 pt.							No	
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										

DOVER AFB

PAGE 1 OF 2

SHOP NAME: ALLIED TRADES

BUILDING: 635

DATE: 3 Mar 86

SHOP SUPERVISOR: Me. Weaver 436 Trans LGTM A.C.W. 678-7222 or 678-6509

SUBSTANCE		AMOUNT USED/DAY M 3MAR	T 4MAR	W 5MAR	T 27FEB	F 28FEB	S	S	WASTE DISPOSAL METHOD I.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD I.e drain
6011 WELDING ELECTRODE 3439-00-262-2652	AM	2 rods			5 rods						
	PM			10 rods							
ACID CORE SOLDER 3434-00-247-6961	AM	Small amount									
	PM										
EUTECTIC CORP YELLOW BRASS ROD 3439-00-027-0048	AM					2 rods					
	PM										
JAEGLE PAINT COMP. ENAMEL GREEN PAINT 8010-P-240-52	AM										
	PM										
CSD CONNOE ENAMEL THINNER 8010-00-160-5794	AM										
	PM		1 qt.								
WOOD PRESERVER 8030-00-634-7970	AM										
	PM										
ADHESIVE RUBBER BASE 8040-00-202-0011	AM										
	PM	1/2 pt.									
6013 WELDING ROD 3439-00-267-4787	AM										
	PM										
MACLICK BLEACH CO HYDROCHLORIC ACID	AM	Small amount									
	PM										

DOVER AFB

PAGE 2 OF 2

SHOP NAME: ALLIED TRADES

BUILDING: 635

DATE: 3 MAR 86

SHOP SUPERVISOR: Mr. Weaver

AV: 455-7222

SUBSTANCE		AMOUNT USED/DAY M 3 MAR	T 4 MAR	W 5 MAR	T [illegible]	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
E.I DUPONT PREPSOL SOLVENT 8010-P-39106	AM										
	PM		1 pt.								
Lacquer Thinner 8010-00-160-5787	AM										
	PM		1 qt								
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										

DOVER AFB

SHOP NAME: GENERAL PURPOSE VEHICLE — BUILDING: 635 — PAGE 1 OF 3

SHOP SUPERVISOR: SSgt OSTRANDER, DAVID — DATE: 26 FEB 86.

AV: 455-6572

SUBSTANCE		AMOUNT USED/DAY M 24 FEB	T 25	W 26	T 27	F 28	S 1 MAR	S 2	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
GENERAL PURPOSE LUBE OIL 9150-00-273-2397	AM								PUT INTO DRUMS TURNED IN		
	PM										
ANTI-FREEZE 6850-00-181-7040	AM								PUT INTO DRUMS TURNED IN	YES	
	PM		4 GAL.	7 GAL.	4 GAL.						
30W OIL 9150-00-189-6729	AM			10 QT.					PUT INTO DRUMS TURNED IN	NO	
	PM				10 QT.						
BATTERY CORROSION PREVENTIVE SPRAY 6830-01-013-9304	AM								NONE	NO	
	PM										
10W-30 OIL 9150-00-186-6703	AM		12 QT.	8 QT.					PUT INTO DRUMS TURNED IN	YES	
	PM		17 QT.	9 QT.							
CLEANING COMPOUND WINDSHIELD 6850-00-926-2275	AM		16 OZ.	16 OZ.					NONE	NO	
	PM		16 OZ.		32 OZ.						
PENETRATING OIL 9150-00261-7899	AM								CLEANED UP WITH RAGS	NO	
	PM										
DEGREASE-O EMULSION DEGREASER	AM								NONE	NO	
	PM										
SPRAY DEGREASER 6850-00-6131-4407	AM		16 OZ		16 OZ				NONE	YES	
	PM			48 OZ.		48 OZ.					

DOVER AFB

PAGE 2 OF 3

SHOP NAME: GENERAL PURPOSE VEHICLE

BUILDING: 835

SHOP SUPERVISOR: SSgt Ostrander

DATE: 25 FEB 86

AV: 455-6512

SUBSTANCE		AMOUNT USED/DAY M 24 FEB	T 25	W 26	T 27	F 28 FEB	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
CLEANING COMPOUND 6850-00935-2082	AM								WASHED DOWN DRAIN WITH WATER	YES	
	PM										
SOLVENT 815 7930P1491630	AM								PUT IN DRUMS TURNED IN	NO	
	PM										
GREASE 9150-00-190-0907	AM		16 OZ.	32 OZ.	,				CLEANED UP WITH RAGS	NO	
	PM				48 OZ.						
BAKING SODA 6810-00-297-0092	AM								WASHED DOWN DRAIN WITH WATER	YES	
	PM										
CARBURETOR CLEANER	AM			16 OZ.					NONE	NO	
	PM										
STARTING FLUID	AM								NONE	NO	
	PM										
DEICING FLUID 6850-00-835-0484	AM								NONE	NO	
	PM										
SULFURIC ACID 6810-00-249-9364	AM										
	PM										
ALCOHOL 6810-00-201-0904	AM								NONE	NO	
	PM										

DOVER AFB

SHOP NAME: GENERAL PURPOSE VEHICLE

BUILDING: 835

DATE: 25 FEB 86

SHOP SUPERVISOR: SSgt OSTRANDER, DAVID

AV: 455-6572

SUBSTANCE		AMOUNT USED/DAY 24 M FEB	25 T	26 W	27 T	28 F FEB	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
AUTOMATIC TRANSMISSION FLUID 9150-00-698-2382	AM		2 QT.						PUT INTO DRUMS TURNED IN		
	PM			6 QT.							
BRAKE FLUID 9150-00-231-9071	AM					1 QT.			NONE	NO	
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										

DOVER AFB

SHOP NAME: GENERAL PURPOSE VEHICLE

BUILDING: 835

DATE: 3 MAR 86

SHOP SUPERVISOR: SSGT OSTRANDER

AV: 455-6572

SUBSTANCE		AMOUNT USED/DAY M 3 MAR	T 4 MAR	W	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
GENERAL PURPOSE LUBE OIL 9150-00-273-2397	AM										
	PM										
ANTI-FREEZE 6850-00-181-7940	AM		4GAL.								
	PM										
30W OIL 9150-00-189-6729	AM		23QT.								
	PM	25QT.									
BATTERY CORROSION PREVENTIVE SPRAY 8030-01-013-9304	AM										
	PM										
10W-30 OIL 9150-00-186-6703	AM										
	PM										
CLEANING COMPOUND WINDSHIELD 6850-00-926-2275	AM										
	PM										
PENETRATING OIL 9150-00261-7899	AM										
	PM										
DEGREASE-O EMULSION DEGREASER	AM										
	PM										
SPRAY DEGREASER 6850-00-6131-4407	AM										
	PM										

DOVER AFB

SHOP NAME: GENERAL PURPOSE VEHICLE

BUILDING: 636

DATE:

SHOP SUPERVISOR: SSgt Ostrander

AV: 455-6572

SUBSTANCE		AMOUNT USED/DAY M 3 MAR	T 4 MAR	W	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
CLEANING COMPOUND 6850-00935-2082	AM										
	PM										
SOLVENT 815 7930P1401630	AM										
	PM										
GREASE 9150-00-190-0907	AM	32oz.	16oz.								
	PM										
BAKING SODA 6810-00-297-0092	AM										
	PM										
CARBURETOR CLEANER	AM		16 oz.								
	PM										
STARTING FLUID	AM										
	PM										
DEICING FLUID 6850-00-835-0484	AM										
	PM										
SULFURIC ACID 6810-00-249-9354	AM										
	PM										
ALCOHOL 6810-00-201-0004	AM										
	PM										

DOVER AFB

SHOP NAME: GENERAL PURPOSE VEHICLE — BUILDING: 636 — DATE: ____________

SHOP SUPERVISOR: SSgt OSTRANDER — AV: ____________

SUBSTANCE		AMOUNT USED/DAY M 3	T 4 MAR	W	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
AUTOMATIC TRANSMISSION FLUID 9150-00-698-2382	AM		4 QT.								
	PM										
BRAKE FLUID 9150-00-231-9071	AM										
	PM	1 PT.									
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										

DOVER AFB

SHOP NAME: REFUEL VEHICLE MAINT. SHOP

BUILDING: 636

DATE: 24-28 Feb

SHOP SUPERVISOR: John T Dwyer Jr WS-5

AV: 455 X6771

SUBSTANCE		AMOUNT USED/DAY							WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
		24 M Feb	25 T Feb	26 W Feb	27 Feb	28 F Feb	1 S Mar	2 S Mar			
LACQUER GLOSS WHITE 8010-00-079-3721	AM										
	PM										
SYCAMORE FAL. LIGHT GRAY PRIMER 8010-00-610-9181	AM										
	PM										
AERVOE PACIFIC CO. RED SPRAY PAINT	AM										
	PM										
NON SLIP WALKWAY COMPOUND 5610-00-641-0427	AM										
	PM										
FLOOR AND DECK ENAMEL 8010-00-577-0216	AM										
	PM										
ZINC CHROMATE PRIMER 8810-00-522-5318	AM										
	PM										
ADHESIVE 8040-00-906-7000	AM										
	PM										
STARTING FLUID 2910-00-046-9727	AM										
	PM										
GRG GREASE 9150-00-257-5380	AM										industrial drain system
	PM	1 pT									

DOVER AFB

SHOP NAME: REFUEL VEHICLE MAINT. SHOP

BUILDING: 638

PAGE 2 OF 4

SHOP SUPERVISOR: John T Dwyer Jr WS-5

DATE 24-28 Feb

AV:

SUBSTANCE		AMOUNT USED/DAY 24 Feb	25 Feb	26 Feb	27 Feb	28 Feb	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
AUTOMOTIVE BRAKE FLUID 9150-00-231-9071	AM										
	PM										
DOW CORNING	AM										
ADHESIVE/SEALANT 8040-00-533-9563	PM										
LUBRICATING OIL 9150-00-100-0000 10W30	AM	1 qt			6 qt	8 qt			Collect in drain pans [illegible] dump in [illegible]	[illegible] drums	
	PM		6 qt								
LEAK PREVENTIVE 6850-00-598-7311	AM										
	PM										
PD 680 6850-00-781-1080	AM					3 gal					Collect in drain pans and dump into 55 gal drums.
	PM										
THINNER SYNTHETIC ENAMEL 8010-00-60-5794	AM										
	PM										
30W OIL 9150-00-189-6729	AM			6 gal		6 gal					Collect in drain pans and dump into 55 gal drums
	PM	6 qt									
815 MX 7930-P-149-6230	AM		1 gal		2 gal						Industrial drain system
	PM	1 gal		1 gal		3 gal					
ETHYLENE GLYCOL 6150-00-181-7940	AM				2 gal						Dump down toilet
	PM										

DOVER AFB

SHOP NAME: REFUEL VEHICLE MAINT. SHOP

BUILDING: 636

PAGE 3 OF 4

DATE 24-28 Feb

SHOP SUPERVISOR: John T Dwyer Jr WS-5

AV:

SUBSTANCE		AMOUNT USED/DAY 24 FEB	25	26	27	28 FEB	$	$	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
BATTERY CORROSION PREVENTATIVE 8050-01-013-9304	AM										
	PM										
EMULSION DEGREASER 6850-00-131-4497	AM		Spray Cans		20oz	20oz					industrial drain system
	PM		20oz								
WINDSHIELD DE-ICER	AM										
	PM										
ACRYLIC LACQUER BLACK 8010-00-382-5582	AM										
	PM										
ACRYLIC LACQUER SILVER 8010-00-721-9751	AM										
	PM										
OLIVE DARK GREEN 8010-P2-4052	AM										
	PM										
ACRYLIC LACQUER BLACK 8010-00-290-6984	AM										
	PM										
JP-4	AM	2gal		30gal						1% in industrial drain sys	99% Collect in drain pans and dump into 55 gal drums Recycle JP4 back to Supply
	PM				15gal						
	AM										
	PM										

DOVER AFB

SHOP NAME: REFUEL VEHICLE MAINT. SHOP

BUILDING: 636

DATE: 3 Mar 86

SHOP SUPERVISOR Mr. Dwyer

AV:

SUBSTANCE		AMOUNT USED/DAY M 3 Mar	T 4	W 5	T 6	F 7 Mar	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
LACQUER GLOSS WHITE 8010-00-079-3721	AM										
	PM	Spray	Cans						14 Air	cans	in Trash
SYCAMORE FAL. LIGHT GRAY PRIMER 8010-00-610-9181	AM										
	PM										
AERVOE PACIFIC CO. RED SPRAY PAINT	AM										
	PM										
NON SLIP WALKWAY COMPOUND 5610-00-641-0427	AM										
	PM										
FLOOR AND DECK ENAMEL 8010-00-577-0216	AM										
	PM										
ZINC CHROMATE PRIMER 8010-00-522-5318	AM										
	PM										
ADHESIVE 8040-00-985-7000	AM										
	PM										
STARTING FLUID 2910-00-646-0727	AM										
	PM										
GHG GREASE 9150-00-257-5360	AM										
	PM										

DOVER AFB

PAGE 2 OF 4

SHOP NAME: REFUEL VEHICLE MAINT. SHOP

BUILDING: 836

DATE: 3 MAR 86

SHOP SUPERVISOR: MR. Dwyer

AV:

March 84

SUBSTANCE		AMOUNT USED/DAY 3 MAR	4 T	5 W MAR	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
AUTOMOTIVE BRAKE FLUID 9150-00-231-9071	AM	1/2 pt								Industrial drain sys	
	PM										
DOW CORNING ADHESIVE/SEALANT 8040-00-533-9563	AM										
	PM										
LUBRICATING OIL 9150-00-186-6699	AM										Collect in
	PM			4 qt							55 gal drums
LEAK PREVENTIVE 6850-00-590-7311	AM										
	PM										
PD 680 6850-00-781-1000	AM			3 qt							Collect in 55 gal drums
	PM		2 qt								
THINNER SYNTHETIC ENAMEL 8010-00-60-5794	AM										
	PM										
30W OIL 9150-00-189-6729	AM			6 gal							Collect in drain pans and dump.
	PM	2 1/2 qt									into 55 gal drums.
015 MX 7930-P-149-6230	AM										Industrial drain system
	PM	1 gal	2 gal	1 gal							
ETHYLENE GLYCOL 6150-00-181-7940	AM										
	PM										

DOVER AFB

BUILDING: 638

PAGE 3 OF 4

SHOP NAME: REFUEL VEHICLE MAINT. SHOP

SHOP SUPERVISOR: Mr. Dwyer

DATE: 3 Mar 82

AV:

SUBSTANCE		AMOUNT USED/DAY 3 Mar	4 Mar	5 Mar	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
BATTERY CORROSION PREVENTATIVE 8050-01-013-9304	AM										
	PM										
EMULSION DEGREASER 6850<006-131-4497	AM										
	PM										
WINDSHIELD DE-ICER	AM										
	PM										
ACRYLIC LACQUER BLACK 8010-00-382-5582	AM										
	PM										
ACRYLIC LACQUER SILVER 8010-00-721-9751	AM										
	PM										
OLIVE DARK GREEN 8010-P2-4052	AM										
	PM										
ACRYLIC LACQUER BLACK 8010-00-290-6084	AM										
	PM										
JP-4	AM	3 gal		1 gal							Recycle JP4's sent back to supply
	PM		1 gal							25% to industrial drain system	
	AM										
	PM										

DOVER AFB

SHOP NAME: Aircraft Wash Rack
BUILDING: 706
DATE: 24 FEB 86
SHOP SUPERVISOR: MR. THIEM NGUYEN
AV: 455-7502

SUBSTANCE		AMOUNT USED/DAY M 24 FEB	T 25	W 26	T 27	F 28	S 1	S 2 MAR	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
Soap	AM	None	X	None	None	None	100G	None			
MIL-C-87936 (CALLA 800)	PM		100 Gal				X				
SOLVENT PD 680 II	AM		X				35G				
	PM		30 Gal				X				
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										

DOVER AFB

SHOP NAME: CLEANING ROOM

BUILDING: 718

DATE: 4 MAR 86

SHOP SUPERVISOR: MSGT LAPINSKI, THOMAS

AV: 455-6997

SUBSTANCE		AMOUNT USED/DAY M	T	W	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
MIL-R-83936 HOT PAINT STRIPPER ~~6810-00-040-1050~~ 8010-L0149334497	AM			NONE					Drum waste in 55 gal drums	YES	Drain
	PM			MACHINE NOT IN OPERATION							
MX 815 LIQUID SOAP ~~6850-00-006-0995~~	AM	/	/	/	/	/				YES	DRAIN
	PM	/	/	/	/	/				YES	
LACQUER REMOVER 8010-00-943-7127	AM			NONE					Drum waste in 55 gal drum		
	PM			WAITING TO DISPOSE OF.							
DESCALING COMPD 6850-00-597-1528	AM		300 GAL CLEANING						Drum waste in 55 gal drum	YES	DRAIN
	PM		TANK DRAINED + CLEANED AS REQUIRED							YES	
PD 680 Type II 6850-00-281-3042	AM	1- 300 GAL CLEANING TANK							Waste into 55 gal drums for recycle	YES	Drain during rinse
	PM	1- 50 GAL CLEANING TANK								Rinsed in hot water	
KEROSENE	AM		1 GAL PER WEEK TO USE TO						NONE.		
	PM	MAKE HOT WATER IN PORTABLE STEAMCLEANER									
EPOXY 3 POLYURETHANE PAINT REMOVER	AM	1- 300 GAL SOAK TANK FOR PARTS							Waste drained in 55 gal drums	YES	Drain
	PM	CLEANED + DRAINED AS NEEDED								Residue rinsed with water	
	AM										
	PM										
	AM										
	PM										

DOVER AFB

SHOP NAME: COMPONENTS REPAIR BUILDING: 719 DATE: 4 MAR 86

SHOP SUPERVISOR: MSGT LAPINSKI, THOMAS AV: 455 6997

SUBSTANCE		AMOUNT USED/DAY M	T	W	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
COLD CARBON REMOVER ~~T.O. CARBON REMOVER~~ ~~6850-00-181-3042~~ 6850-00-285-4321	AM	20	GAL	A	MONTH.				WASTE GOES INTO 55 GAL DRUM	YES	DRAINS INTO 500 GAL HOLDING TANK
	PM										
CALIBRATION FLUID 6850-00-264-5771	AM	5	GALS	EVERY	30 DAY.				WASTE GOES INTO 55 GAL DRUMS	NO	NO
	PM	USED	IN FUEL	NOZZLE	TEST	MACHINE					
TRICHLOROETHANE 6810-00-~~812-0181~~ 472-5213	AM	30	GALS	EVERY	90 DAY				WASTE GOES INTO 55 GAL DRUM	NO	NO
	PM	TO RE	SERVILE	ULTRA-	SONIC	CLEANER					
DEXTER CORP EA 934 (PART A)	AM										
	PM	GOES	TO	GETHER		1 KIT	PER WEEK		UNUSED	GOES INTO	
DEXTER CORP EA 934 (PART B)	AM								TRASH.		
	PM										
~~PENETRATING OIL~~ ~~9150-00-261-7899~~	AM										
	PM										
~~ACETONE~~ ~~6810-00-184-4796~~	AM										
	PM										
~~PHENOLIC PLASTIC~~ ~~DEXHOO BLM-DUST~~	AM										
	PM										
~~SHELL CHEM COP~~ ~~EPOXY RESIN~~	AM										
	PM										

DOVER AFB

SHOP NAME: COMPONENTS REPAIR BUILDING: 719 DATE: 4 MAR 86

SHOP SUPERVISOR: MSgt LAPINSKI, THOMAS AV: 455-6997

SUBSTANCE		AMOUNT USED/DAY M	T	W	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
~~ZINC CHROMATE PRIMER 8010-00-161-7436~~	AM										
	PM										
~~DIETHYLENE TRIAMINE 6810-00-945-4884~~	AM										
	PM										
LUBRICANT SOLID FILM 9150-00-754-0064	AM		2	CANS	PER	MONTH			EMPTY CANS GO IN TRASH	NO	NO
	PM										
DACON INDUSTRIES FLEXOBON D 329 RESIN	AM										
	PM	NOT		IN	USE		AT				
DACON INDUSTRIES FLEXOBON D 329 HARDENER	AM										
	PM		THIS		TIME						
DEXTER CORP EA 901/B1	AM	NOT		IN	USE		AT	THIS	TIME		
	PM										
ADHESIVE TYPE I 8040-00941-9984	AM	1	PINT		PER	WEEK			EMPTY CAN TO TRASH	NO	NO
	PM										
	AM										
	PM										
	AM										
	PM										

DOVER AFB

SHOP NAME: NON POWERED AGE PROPULSION BUILDING: 719

DATE: 4 MAR 86

SHOP SUPERVISOR: MSGT LIPINSKI, THOMAS

AV: 455 -6997

SUBSTANCE		AMOUNT USED/DAY M	T	W	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
FLAT BLACK SPRAY PAINT 8010-00-067-5437	AM		2 CANS		PER				EMPTY CANS GO IN TRASH	NO	NO
	PM			WEEK							
RED LACQUER SPRAY PAINT 8010-00-141-2952	AM		2	CANS	PER						
	PM			WEEK							
WHITE LACQUER SPRAY PAINT 8010-00-598-5733	AM			1 CAN	PER						
	PM				WEEK						
YELLOW SPRAY PAINT 8010-00-852-8033	AM			1 CAN	PER						
	PM				WEEK						
HYDRAULIC FLUID FIRE RESISTANT 9150-00-149-7431	AM		5 GALS		A	MONTH			WASTE GALS INTO 55 GAL DRUM	NO	NONE
	PM										
BRAKE FLUID 9150-00-231-9071	AM		2 GALS	A	MONTH				WASTE GALS INTO 55 GAL DRUM	NO	NONE
	PM										
GREASE AUTOMOTIVE AND ARTILLERY 9150-00-930-1017	AM		2	POUNDS	PER	MONTH			EMPTY CANS GO IN TRASH	NO	DIRTY RAGS AND GREASE GO IN TRASH
	PM										
OLIVE DRAB SPRAY PAINT 8010-00-503-6038	AM		8 CANS		PER	WEEK			EMPTY CANS IN TRASH	NO	NONE
	PM										
ALL PURPOSE CLEANER 7930-00-357-7386	AM	/	/	/	/	/			EMPTY BOTTLES GO INTO TRASH	NO	NONE
	PM										

DOVER AFB

PAGE 1 OF 2

SHOP NAME: MODULES AND ACCESSORY REPAIR BUILDING: 719 DATE: 4 MAR 86

SHOP SUPERVISOR: MSGT LAPINSKI, THOMAS AV: 455-6997

SUBSTANCE		AMOUNT USED/DAY M	T	W	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
~~HOT CARBON REMOVER 6850-00-281-3043~~	AM			NONE							
	PM										
PD-680 TYPE II 6850-00-285-8011	AM		7 GAL	A	MONTH - USED TO				WASTE GOES INTO 55	GAL DRUM	FOR
	PM	SERVICE	BEARING	CLEANING	MACHINE				RECYCLING		
FINGERPRINT REMOVER	AM		AVR USE	1	PINT				NONE		
	PM		IN 12	MONTH	PERIOD						
~~BEARING PRESSURE OIL 6850-00-200-7330~~	AM			NONE							
	PM										
MOBIL SYNTHETIC ENGINE OIL 9150-00-782-2627 MIL-L-7808	AM		APP	1 QT		PER	MONTH		PUT IN WASTE OIL DRUM 55 GAL	NONE	
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										

DOVER AFB

SHOP NAME: GTU SHOP

BUILDING: 719

SHOP SUPERVISOR: TSgt Ourey, Larry A

DATE: 24 Feb 86

AV: 455-6497

SUBSTANCE		AMOUNT USED/DAY M	T	W	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
PENETRATING OIL 9150-00-261-7809	AM	4oz	7oz	5oz	4oz	4oz			USED UP	N	
	PM	6oz	2oz	2oz	6oz	8oz			USED UP	N	
LEAK DETECTION COMP 6850-00-621-1820	AM										
	PM										
ASSEMBLE FLUID 9150-00-159-5012	AM	4oz	2oz	11oz	5oz	4oz			USED UP	N	
	PM	8oz	–	3oz	5oz	4oz			"	N	
ANTISEIGE 8030-00-251-3900	AM	2oz	–	4oz	1/2oz	3oz			USED UP	N	
	PM	2oz	1/2oz	1 1/2oz	1/2oz	4oz			NO WASTE	N	
RED RTU SEALANT 8040-00-941-9084	AM	1oz							USED UP	N	
	PM			2oz					USED UP	N	
BLACK RTU SEALANT 8040-00-865-8991	AM										
	PM										
LAYOUT DYE BLUE 6850-00-664-9067	AM			1/2oz			1/4 oz		NO waste	N	
	PM		1/4 oz			1/2 oz			NO WASTE	N	
BREAK FREE 9150-01-054-6483	AM										
	PM										
RTV SILICON RUBBER 8040-00-181-6380	AM		1/4 oz						USED UP	N	
	PM					1/2oz			USED UP	N	

SHOP NAME: GTU SHOP

SHOP SUPERVISOR: TSgt Quarey, LARRY A.

DOVER AFB

BUILDING: 719

PAGE 2 OF 7

DATE: 24 FEB 86

AV:

SUBSTANCE		AMOUNT USED/DAY M	T	W	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
ISOPROPYL ALCOHOL 6506-00-290-8095	AM	4oz	3oz	16oz	—	2oz	~~3oz~~			N	
	PM	—	2oz.	5oz	16oz	4oz			RAG, USED TRASHED	N	
BLACK LACQUER AEROSOL 8010-00-280-6984	AM										
	PM										
XVD-40	AM	1/2 oz		1oz.		1/2 oz				N	
	PM		2oz	1/2 oz						N	
ADHESIVE CYANOACRYLATE 8040-00-142-9103	AM										
	PM										
MAGNAFLUX CLEANER REMOVER 6810-00-930-6311	AM	1oz			3oz	3oz			USED UP	N	
	PM		1oz	2oz		2 1/2 oz.			USED UP	N	
RTU 8111 8030-00-142-9128	AM				2oz	1oz			USED UP	N	
	PM			1oz					USED UP	N	
RTU 9891 CATALYST 8030-00-142-9128	AM										
	PM										
SILICON GS 4004 8030-00-142-9128	AM										
	PM										
7800 OIL 9150-00-782-8025	AM			8 qts					Drained into 55 gal Drum, Disposed of Waste Disposal	N	
	PM				4 qts					N	

DOVER AFB

PAGE 3 OF 3

SHOP NAME: GTU SHOP

BUILDING: 719

DATE: 24 FEB '86

SHOP SUPERVISOR: TSgt Qwrey

AV:

SUBSTANCE		AMOUNT USED/DAY M	T	W	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
WHITE PETROLEUM LUBRICANT 6505-00-133-8025	AM		2 oz	4 oz		1 oz			USED up	N	
	PM	1 oz			3 oz	2 oz			USED up	N	
JP4 Jet Fuel	AM	30 GAL	For	this		Week				N	
	PM									N	
MIL-L-1010 oil	AM	2 qts							USED up	N	
	PM				2 qts				USED up	N	
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										

SHOP NAME: FIBERGLASS SHOP — DOVER AFB — PAGE 1 OF 2

BUILDING: 72D — DATE: ______

SHOP SUPERVISOR: ______ — AV: ______

SUBSTANCE		AMOUNT USED/DAY M	T	W	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
SEALING COMPOUND 8030-00-470-9134	AM										
PRC 5/1	PM										
EA 9309 ADHESIVE 8040-01-012-8749	AM										
	PM										
1751 EPOXY ADHESIVE 8040-00-959-1854	AM										
	PM										
EA 934NA	AM										
8040 00 016 8662	PM										
DTA	AM										
6810 00 995 4804	PM										
EKU 928	AM										
8030 00 992 3156	PM										
POLYESTER	AM										
8040 00 633 8373	PM										
FIRE WALL SEAL	AM										
8030 00 723 5345	PM										

NOTE: FAIRLY CONSTANT YEAR ROUND

DOVER AFB

PAGE 1 OF 3

SHOP NAME: PAINT SHOP & ISO

BUILDING: 721

DATE: 4-FEB-86

SHOP SUPERVISOR: MSGT PERRINE, JAMES

AV: 455-6556

SUBSTANCE		AMOUNT USED/DAY FEB M 24	T 25	W 26	T 27	F 28	MAR S 1	S 2	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
MEK 6810-00-281-2763	AM	25 gl	25 gL	2.5 gL	2.5 gl	2.5 gL	0.1 gL	0.1 gL	Drum	NO	N/A
	PM	25	2.5	25	25	25	0.1	0.1	"	"	"
8010-00-160-5784 Dope & Lac Thinner	AM	20	2.0	2.0	20	20	0.1	0.1	Drum	NO	"
	PM	2.0	20	20	20	20	0.1	0.1		"	"
6810-00-290-0046 Toulene	AM	0.5	0.5	0.5	0.5	0.5	0.1	0.1	Drum	NO	"
	PM	1.0	1.0	1.0	1.0	1.0	0.1	0.1	"	"	"
8010-00-280-1751 Polyurethane Thinner	AM	1.0	1.0	1.0	1.0	1.0	0.1	0.1	Drum	NO	"
	PM	1.0	1.0	1.0	1.0	1.0	0.1	0.1	"	"	"
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										

DOVER AFB

SHOP NAME: METAL PLATING AND WELDING BUILDING: 724 DATE: 2 mar 86

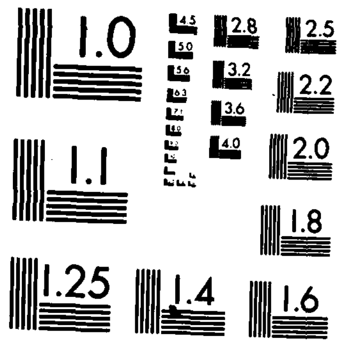
SHOP SUPERVISOR: MSGT Jackson, Charles A AV: 455-6857

SUBSTANCE		AMOUNT USED/DAY M	T	W	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
AIRCO SIL FLUX 3489-P9041201	AM	0	0	0	0	0	0	0			
	PM										
STAY SILV. SILVER SOLDER FLUX 3439-P40023	AM	0	0	0	0	0	0	0			
	PM										
EUTECTIC 1894 FLUX 3439-P30883	AM	0	0	0	0	0	0	0			
	PM										
EUTECTIC 21-K FLUX 3439-P113082	AM	0	0	0	0	0	0	0			
	PM										
SILVER SOLDER RIBBON 3439-P2014	AM	0	0	0	0	0	0	0			
	PM										
EUTECTIC SUPERSIC PASTE FLUX	AM	0	0	0	0	0	0	0			
	PM										
ELECTRODE 680 3439-P680	AM	0	0	0	0	0	0	0			
	PM										
ELECTRODE, 41MP 3439-P41MP	AM	0	0	0	0	0	0	0			
	PM										
ELECTRODE 6010	AM	½ lb.	½ pound	½ pound	½ pound	½ pound	0	0	Trash	N	
	PM	½ lb.	½ pound	½ pound	½ pound	½ pound	0	0	Trash	N	

AD-A170 785 DOVER AFB CHARACTERIZATION/HAZARDOUS WASTE MANAGEMENT SURVEY DOVER AFB DE (U) AIR FORCE OCCUPATIONAL AND ENVIRONMENTAL HEALTH LAB BROOKS AF R D BINOVI ET AL.

UNCLASSIFIED JUL 86 USAFOEHL-86-053EQ0052GIB F/G 13/2 NL

2/2



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

DOVER AFB

SHOP NAME: METAL PLATING AND WELDING SHOP

BUILDING: 724

PAGE 2 OF 6

SHOP SUPERVISOR: MSGT Jackson

DATE: ______

AV: ______

SUBSTANCE		AMOUNT USED/DAY M	T	W	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
ELECTRODE 6013	AM	1/4 lb.	1/4 pound	1/4 pound	0	0	0	0	Trash	N	
	PM	0	0	0	0	0	0	0			
ACETIC ACID	AM	0	0	0	0	0	0	0			
	PM	0	0	0	0	0	0	0			
NITRIC ACID 6810-00-235-5676	AM	0	0	0	0	0	0	0			
	PM	0	0	0	0	0	0	0			
BARIUM HYDROXIDE 6810-00-234-8362	AM	0	0	0	0	0	0	0			
	PM	0	0	0	0	0	0	0			
CORROSION PREVENTATIVE 6810-00-224-9582	AM	0	0	0	0	0	0	0			
	PM	0	0	0	0	0	0	0			
SILVER SOLDER 3439-00-184-8951	AM	0	0	0	0	1 stick	0	0	Small pieces are saved for [illegible]	Sometimes	Sink
	PM	0	0	0	0	0	0	0			
FLUX SOLDER 3439-00-145-9132	AM	0	0	0	0	0	0	0			
	PM	0	0	0	0	0	0	0			
ELECTRODE, NICKEL (141) 3439-00-165-4148	AM	0	0	0	0	0	0	0			
	PM	0	0	0	0	0	0	0			
ELECTRODE 3439-00-270-9873	AM	0	0	0	0	0	0	0			
	PM	0	0	0	0	0	0	0			

DOVER AFB

SHOP NAME: METAL PLATING AND WELDING SHOP

BUILDING: 724

DATE: 7 Mar 86

SHOP SUPERVISOR: MSGT Jackson

AV:

SUBSTANCE		AMOUNT USED/DAY M	T	W	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
ELECTRODE 3439-00-833-3476	AM	0	0	0	0	0	0	0			
	PM	0	0	0	0	0	0	0			
ELECTRODE 3439-00-984-4783	AM	0	0	0	0	0	0	0			
	PM	0	0	0	0	0	0	0			
ELECTRODE 3439-00-200-1376	AM	0	0	0	0	0	0	0			
	PM	0	0	0	0	0	0	0			
ALUMINUM FILLER ROD 3439-00-264-5029 3439-00-277-6573	AM	½ pound	½ pound	½ pound	0	0	0	0	Trash	N	
	PM	0	0	0	½ pound	½ pound	0	0	Trash	N	
BRAZING ROD (BRASS) 3439-00-269-9668	AM	0	0	0	0	0	0	0			
	PM	0	0	0	0	0	0	0			
INCONEL 62 3439-00-178-8593	AM	0	0	0	0	0	0	0			
	PM	0	0	0	0	0	0	0			
HASTELLOY X 3439-00-882-7351	AM	0	0	0	0	0	0	0			
	PM	0	0	0	0	0	0	0			
TITANIUM 3439-00-994-6368	AM	2 sticks	2 sticks	2 sticks	2 sticks	2 sticks	0	0	Trash	N	
	PM	2 sticks	2 sticks	2 sticks	2 sticks	2 sticks	0	0	Trash	N	
MAGNESIUM 3439-00-178-8589	AM	0	0	0	0	0	0	0			
	PM	0	0	0	0	0	0	0			

DOVER AFB

SHOP NAME: METAL PLATING AND WELDING SHOP

BUILDING: 724

DATE: 2 mar 86

SHOP SUPERVISOR: MSGT Jackson

AV:

SUBSTANCE		AMOUNT USED/DAY M	T	W	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
L-605 3449-00-554-6041	AM	0	0	0	0	0	0	0			
	PM	0	0	0	0	0	0	0			
INCONER 69 3439-00-555-4378	AM	0	0	0	0	0	0	0			
	PM	0	0	0	0	0	0	0			
N155 3439-00-887-7350	AM	0	0	0	0	0	0	0			
	PM	0	0	0	0	0	0	0			
410 3439-00-541-2769	AM	0	0	0	0	0	0	0			
	PM	0	0	0	0	0	0	0			
312 3439-00-541-8970	AM	0	0	0	0	0	0	0			
	PM	0	0	0	0	0	0	0			
19-9 3439-00-163-4360	AM	0	0	0	0	0	0	0			
	PM	0	0	0	0	0	0	0			
17-4PH 3439-00-542-0411	AM	0	0	0	0	0	0	0			
	PM	0	0	0	0	0	0	0			
MILD STEEL 3438-00-248-0575	AM	0	0	0	0	0	0	0			
	PM	0	0	0	0	0	0	0			
	AM										
	PM										

DOVER AFB

BUILDING: 724

SHOP NAME: MACHINE SHOP vance G.

SHOP SUPERVISOR: MSgt A White

DATE: FEB 24

AV: 455-6856

SUBSTANCE		AMOUNT USED/DAY M	T	W	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
ADHESIVE CYANOCRYLATE 8010-00-826-3535	AM										
	PM										
SEALING COMPOUND 8030-00-081-2339	AM										
	PM										
PD 680 6850-00-637-6135 5 gallons/2 mo	AM										
	PM										
LAPPING COMPOUND 5350-00-193-1340	AM										
	PM										
EPOXI 8040-00-777-0831	AM										
	PM										
GRINDING COOLANT 9160P08272	AM										
	PM										
MAGIC TAPE 5310L0461334407	AM										
	PM										
THREAD COMPOUND 8030-00-087-8630	AM										
	PM										
LAYOUT FLUID 6850-00-664-9067	AM										
	PM										

DOVER AFB

BUILDING: 724

SHOP NAME: MACHINE SHOP

SHOP SUPERVISOR: MSgt White

DATE: 24 FEB

AV:

SUBSTANCE		AMOUNT USED/DAY M	T	W	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
LUBE OIL 9150-00-189-6779	AM										
	PM										
PENETRATING OIL TYPE I 9150-00-261-7899	AM										
	PM										
N/A? ~~DIETHYLENE TRIAMINE 6810-00-995-4804~~	AM										
	PM										
N/A ~~MEK PEROXIDE 8030-00-[illegible]-5424~~	AM										
	PM										
N/A ~~EPON 834NA RESIN 8040-01-102-2698~~	AM										
	PM										
N/A ~~POLYESTER RESIN 8040-00-922-[illegible]~~	AM										
	PM										
EPOXY PATCH 8040-00-777-0831	AM										
	PM										
N/A ~~[illegible] DRYER 8010-00-[illegible]-4782~~	AM										
	PM										
N/A ~~AUTOBODY FILLER 8010-00-[illegible]~~	AM										
	PM										

DOVER AFB

SHOP NAME: MACHINE SHOP | BUILDING: 724 | PAGE 3 OF 4

SHOP SUPERVISOR: MSgt White

DATE: 24 FEB

AV:

SUBSTANCE		AMOUNT USED/DAY M	T	W	T	F	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
ADHESIVE CEMENT 8040-00-575-2250	AM										
	PM										
N/A ~~MIRROR GLAZE MOLD RELEASE WAX~~	AM										
	PM										
N/A ~~[illegible]MER 68[illegible]-00-[illegible]~~	AM										
	PM										
HI PRESSURE GREASE 9150-PR-24837-8-1	AM										
	PM										
INK, MARKING MATERIAL 7510-NSL	AM										
	PM										
EIP MOLLY DRILUBE 9150PD-5460	AM										
	PM										
WD 40 6850PWD-40	AM										
	PM										
AUTOMOTIVE GREASE 9150-00-190-0907	AM										
	PM										

DOVER AFB

SHOP NAME: MACHINE SHOP | BUILDING: 724 | PAGE 4 OF 4

SHOP SUPERVISOR:

DATE:

AV:

				DOVER AFB					PAGE 1 OF 3			

SHOP NAME: Entomology BUILDING: 921 DATE: ________

SHOP SUPERVISOR: MSgt Tommy Hucks AV: 455-6748

SUBSTANCE			AMOUNT USED/DAY M	T	W	T 27 Feb	F 28 Feb	S 1 Mar	S 2 Mar	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
		AM										
Ficam	1300hrs	PM				1 gal E.C. Soln / 0.4oz					Used 1½ gal of water to [illegible]	
Dursban 1.0		AM							3.5 gal E.C. 3.5 gal / 40ml		Used 5 gal of water to rinse sprayer	
Dursban 4E		PM										
		AM										
		PM										
		AM										
		PM										
		AM										
		PM										
		AM										
		PM										
		AM										
		PM										
		AM										
		PM										
		AM										
		PM										

DOVER AFB

SHOP NAME: Entomology BUILDING: ________ DATE: ____________

SHOP SUPERVISOR: MSgt Brooks AV: 455-6748

SUBSTANCE		AMOUNT USED/DAY M 3MAY	T 4MAY	W 5MAY	T 6MAY	F 7MAY	S	S	WASTE DISPOSAL METHOD i.e drain	IS ANYTHING RINSED OR COOLED OFF (Y/N)	WASTE DISPOSAL METHOD i.e drain
Dursban 4E / 1400hrs	AM										
	PM	1/8 gal [illegible] 20ml								Used 1/8 gal to rinse sprayer	
Carbamate 15 / 0900hrs	AM				1/4 gal fin spray 2 oz					Used 1/4 gal to rinse sprayer	
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										
	AM										
	PM										

Attachment 15
Acutel Toxicity to Daphnida of Various Chemicals Distribution List

ACUTE TOXICITY TO DAPHNIDS OF VARIOUS CHEMICALS

POLLUTANT	SPECIES	LEVEL	REF
ACENAPHTHENE	D.MAGNA	48HR LC50 41,200 ug/L	WPCF,80
ACROLEIN	D.MAGNA	48HR LC50 80 ug/L	WPCF,80
ACRYLONITRILE	D.MAGNA	48HR LC50 7550 ug/L	WPCF,80
ANTIMONY	D.MAGNA	48HR LC50 >530,000 ug/L	WPCF,80
ANTIMONY TRICHLORIDE	D.MAGNA	48HR LC50 19,000 ug/L	WPCF,80
ALACHLOR (LASSO)	D.PULEX	48HR EC50 3.8-12.3 mg/L	ECT,85
ARSENIC	DAPHNID	48HR LC50 1.7-3.8 mg/L	WPCF,85
ATRAZINE 4L	D.PULEX	48HR EC50 28.3-46.3 mg/L	ECT,85
BENZENE	D.MAGNA	48HR LC50 230000 ug/L	WPCF,80
BERYLLIUM	D.MAGNA	48HR LC50 2500 ug/L	WPCF,80
BIS-ETHER	D.MAGNA	48HR LC50 237000 ug/L	WPCF,80
BORIC ACID	D.MAGNA	48HR LC50 226 ug/L	WPCF,82
4BROMOPHENYL-PHENYL ETHER	D.MAGNA	48HR LC50 360 ug/L	WPCF,80
BROMOFORM	D.MAGNA	48HR LC50 46500 ug/L	WPCF,80
BUTYLBENZYL PHTHALATE	D.MAGNA	48HR LC50 92300 ug/L	WPCF,80
CADMIUM	DAPHNID	48HR LC50 24-118 ug/L	WPCF,85
CARBON TETRACHLORIDE	D.MAGNA	48HR LC50 35200 ug/L	WPCF,80
CHLOROBENZENE	D.MAGNA	48HR LC50 86000 ug/L	WPCF,80
CHLOROETHANOL	DAPHNID	48HR LC50 250-574 uL/L	WPCF,85
CHLOROFORM	D.MAGNA	48HR LC50 28900 ug/L	WPCF,80
4CHLORO-6METHYL PHENOL	D.MAGNA	48HR LC50 290 ug/L	WPCF,80
1,CHLORONAPHTHALENE	D.MAGNA	48HR LC50 1600 ug/L	WPCF,80
2,CHLOROPHENOL	D.MAGNA	48HR LC50 2580 ug/L	WPCF,80
4,CHLOROPHENOL	D.MAGNA	48HR LC50 4060 ug/L	WPCF,80
CHLORINE	D.MAGNA	1HR LC50 63 ug/L	WPCF,82
COPPER	DAPHNID	48HR LC50 17-57 ug/L	WPCF,85
1,2DICHLOROBENZENE	D.MAGNA	48HR LC50 2440 ug/L	WPCF,80
1,3DICHLOROBENZENE	D.MAGNA	48HR LC50 28100 ug/L	WPCF,80

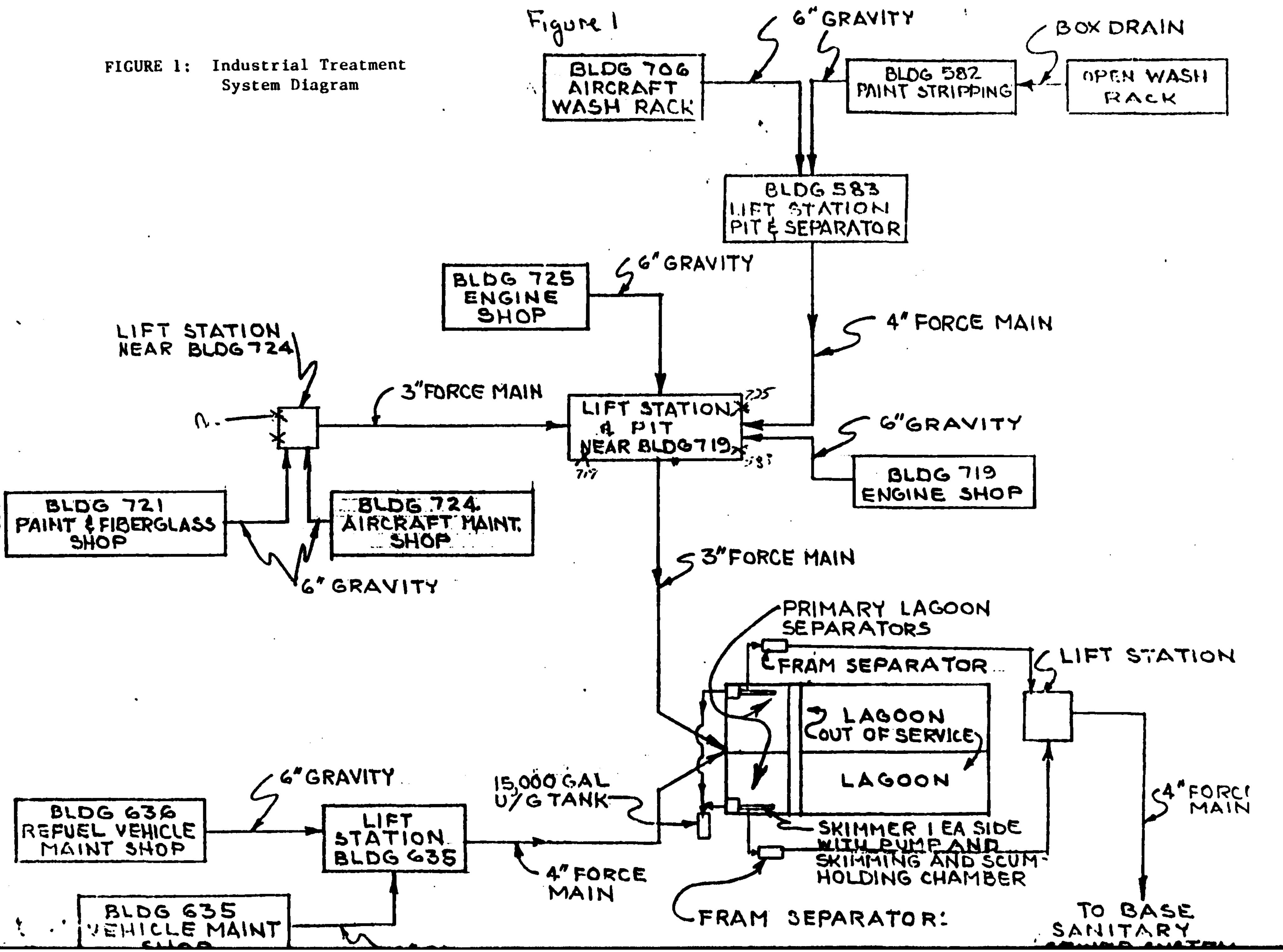
1,4DICHLOROBENZENE	D.MAGNA	48HR LC50 11000 ug/L	WPCF,80
CHLORDANE	D.MAGNA	MATC 16.2 ug/L	WPCF,80
1,2DICHLOROETHANE	D.MAGNA	48HR LC50 218000 ug/L	WPCF,80
1,1DICHLOROETHENE	D.MAGNA	48HR LC50 11600 ug/L	WPCF,80
2,4DICHLORO-6METHYLPHENOL	D.MAGNA	48HR LC50 430 ug/L	WPCF,80
2,4DICHLOROPHENOL	D.MAGNA	48HR LC50 2600 ug/L	WPCF,80
1,1DICHLOROPROPANE	D.MAGNA	48HR LC50 23000 ug/L	WPCF,80
1,2DICHLOROPROPANE	D.MAGNA	48HR LC50 52500 ug/L	WPCF,80
1,3DICHLOROPROPANE	D.MAGNA	48HR LC50 6150 ug/L	WPCF,80
CHROMIUM	D.MAGNA	MATC 455 ug/L	WPCF,80
DIETHYL PHTHALATE	D.MAGNA	48HR LC50 52100 ug/L	WPCF,80
DI-2ETHYL HEXYLPHTHALATE	D.MAGNA	48HR LC50 11100 ug/L	WPCF,80
2,4DIMETHYLPHENOL	D.MAGNA	48HR LC50 2120 ug/L	WPCF,80
DIMETHYL PHTHALATE	D.MAGNA	48HR LC50 33000 ug/L	WPCF,80
2,4DINITROPHENOL	D.MAGNA	48HR LC50 4090 ug/L	WPCF,80
2,4DINITRO-6METHYLPHENOL	D.MAGNA	48HR LC50 3120 ug/L	WPCF,80
2,3DINITROTOLUENE	D.MAGNA	48HR LC50 660 ug/L	WPCF,80
1,2DIPHENYLHYDRAZINE	D.MAGNA	48HR LC50 4100 ug/L	WPCF,80
DIELDRIN	D.PULEX	48HR EC50 251 ug/L	WPCF,82
DIMETHYLQUINONE	D.MAGNA	48HR LC50 40 mg/L	WPCF,85
DINITROCRESOLS	D.MAGNA	48HR LC50 33.4 mg/L	WPCF,85
ETHYLBENZENE	D.MAGNA	48HR LC50 75000 ug/L	WPCF,80
FLUORANTHENE	D.MAGNA	48HR LC50 325000 ug/L	WPCF,80
FUELS (SOLUBLE FRACTION)			
NO.2 DIESEL	D.MAGNA	48HR EC50 67,000 ppm	WPCF,80
NO.6 FUEL OIL	D. MAGNA	48HR EC50 1,000,000 ppm	WPCF,80
FURADAN 4(CARBOFURAN)	D.PULEX	48HR EC50 26.8-45.8 ug/L	ECT,85
HEXACHLOROETHANE	D.MAGNA	48HR LC50 8070 ug/L	WPCF,80
ISOPHORONE	D.MAGNA	48HR LC50 117000 ug/L	WPCF,80
KEPONE	D.MAGNA	MATC 9-18 ug/L	WPCF,82

MERCURY	D.MAGNA	MATC 1.87 ug/L	WPCF,80
METHYLENE CHLORIDE	D.MAGNA	48HR LC50 224000 ug/L	WPCF,80
MIREX	D.MAGNA	MATC >34 ug/L	WPCF,82
NAPHTHALENE	D.MAGNA	48HR LC50 8570 ug/L	WPCF,80
NITROBENZENE	D.MAGNA	48HR LC50 27000 ug/L	WPCF,80
4NITROPHENOL	D.MAGNA	48HR LC50 21900 ug/L	WPCF,80
N-NITROSO-DIPHENYLAMINE	D.MAGNA	48HR LC50 7760 ug/L	WPCF,80
OCTACHLORONAPHTHALENE	D.MAGNA	48HR LC50 >530000 ug/L	WPCF,80
PENTACHLOROBENZENE	D.MAGNA	48HR LC50 5280 ug/L	WPCF,80
PENTACHLOROETHANE	D.MAGNA	48HR LC50 62900 ug/L	WPCF,80
PENTACHLOROPHENOL	DAPHNID	48HR LC50 140-280 ug/L	WPCF,85
PENTANEDIONE	DAPHNID	48HR LC50 35->50 uL/L	WPCF,85
PHENOL	D.MAGNA	48HR LC50 11800 ug/L	WPCF,80
SELENIOUS ACID	D.MAGNA	48HR LC50 1200 ug/L	WPCF,80
SELENIUM	D.MAGNA	48HR LC50 430 ug/L	WPCF,80
SILVER	DAPHNID	48HR LC50 11-15 ug/L	WPCF,85
SURFACTANTS	D.MAGNA	25DAY LC50 78-126 mg/L	WPCF,85
1,2,3,5TETRACHLOROBENZENE	D.MAGNA	48HR LC50 9710 ug/L	WPCF,80
1,2,4,5TETRACHLOROBENZENE	D.MAGNA	48HR LC50 >530000 ug/L	WPCF,80
1,1,1,2TETRACHLOROETHANE	D.MAGNA	48HR LC50 23900 ug/L	WPCF,80
1,1,2,2TETRACHLOROETHANE	D.MAGNA	48HR LC50 9320 ug/L	WPCF,80
TETRACHLOROETHENE	D.MAGNA	48HR LC50 17700 ug/L	WPCF,80
2,3,5,6TETRACHLOROPHENOL	D.MAGNA	48HR LC50 570 ug/L	WPCF,80
2,3,4,6TETRACHLOROPHENOL	D.MAGNA	48HR LC50 290 ug/L	WPCF,80
THALLIUM	D.MAGNA	48HR LC50 2180 ug/L	WPCF,80
TOLUENE	D.MAGNA	48HR LC50 313000 ug/L	WPCF,80
TOLUIDINES	D.MAGNA	48HR LC50 750 ug/L	WPCF,85
TOXAPHENE	D.MAGNA	48HR LC50 10 ug/L	WPCF,80
1,2,4TRICHLOROBENZENE	D.MAGNA	48HR LC50 50200 ug/L	WPCF,80
1,1,2TRICHLOROETHANE	D.MAGNA	48HR LC50 18000 ug/L	WPCF,80

1,1,1TRICHLOROETHANE	D.MAGNA	48HR LC50 >530000 ug/L	WPCF,80
TRICHLOROETHENE	D.MAGNA	48HR LC50 85200 ug/L	WPCF,80
2,4,5TRICHLOROPHENOL	D.MAGNA	48HR LC50 2660 ug/L	WPCF,80
2,4,6TRICHLOROPHENOL	D.MAGNA	48HR LC50 6040 ug/L	WPCF,80
2,4,6TRINITROPHENOL	D.MAGNA	48HR LC50 84700 ug/L	WPCF,80
ZINC	D.MAGNA	48HR LC50 68-110ug/L	WPCF,85
	D.MAGNA	48HR EC50 1.1-1.7 mg/L	WPCF,85

LC50 = median lethal concentration
EC50 = median effective concentration
LD50 = median lethal dose
MATC = maximum acceptable toxicant concentration
WPCF = Journal Water Pollution Control Federation, June issue (literature review
ECT = Bulletin of Environmental Contamination Toxicology

FIGURE 1: Industrial Treatment System Diagram



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